Draft Report

Additional Chemical Characterization of Sediments along Berths 240X, Y, and Z

Port of Los Angeles

Prepared for:

Port of Los Angeles
Environmental Management
425 South Palos Verdes Street
San Pedro, California 90731

July 2010

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ACRONYMS AND ABBREVIATIONS

µg/kg	micrograms per kilogram
CDF	confined disposal facility
COC	chain of custody
CSTF	Contaminated Sediments Task Force
DBT	dibutyltin
DDT	dichlorodiphenyltrichloroethane
DTSC	Department of Toxic Substances Control
ER-M	effects range – median
ERMq	effects range median quotient
GIS	geographic information system
HERD	Human and Ecological Risk Division
ID	identification
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MCDP	Main Channel Deepening Project
MS	matrix spike
MSD	matrix spike duplicate
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PDS	post digestion spike
PDSD	post digestion spike duplicate
POLA	Port of Los Angeles
QA	quality assurance
QC	quality control
RL	reporting limit
RPD	relative percent difference
SAP	sampling and analysis plan
SQO	sediment quality objective
SWM	Southwest Marine
TBT	tributyltin
TOC	total organic carbon
TTBT	tetrabutyltin
TTLC	total threshold limit concentration
USEPA	United States Environmental Protection Agency
VSP	Visual Sampling Plan
WESTON®	Weston Solutions, Inc.

APPENDICES

A – Field Data
B – Chemistry Data
C – Quality Assurance Data
D – Chain-of-Custody Form

1.0 INTRODUCTION

1.1 Background and History

At the request of the Department of Toxic Substances Control (DTSC), the Port of Los Angeles (POLA) conducted additional sediment investigation along and adjacent to Berths 240X, Y, and Z to determine the nexus between the land and waterside contamination and to further delineate the extent of vertical and horizontal sediment contamination in the area. Berths 240X, Y, and Z are part of the former Southwest Marine (SWM) leasehold property on Terminal Island in POLA. SWM leased this property in the POLA from 1981–2005 for the operation of a ship repair, retrofit, and demolition business. Prior to 1981, the property was occupied by Southwest Shipbuilding Company (1918–1921) and Bethlehem Shipbuilding Corporations, Ltd. (1921–1981). The leasehold area was divided into six parcels, and three of these parcels included waterways. Parcel 4 was predominantly covered by water, and contained two large dry docks, whereas Parcels 5 and 6 were narrow stretches of land along Berths 240X, Y, and Z.

This study focused on the delineation of sediment contamination in areas that were not recently dredged. Dredging of sediment in the vicinity of the former SWM leasehold area has occurred in two locations in recent years. The most recent dredging was at Berth 240B, located adjacent to the Exxon Mobil tank farm across the Berth 240 Slip from the SWM site (Figure 1). Approximately 6,500 cubic yards (cy) of sediment was dredged from the Berth 240B area (to a depth of -37 to -39 ft mean lower low water (MLLW)) in July 2006 and taken to the POLA's approved upland disposal site at Anchorage Road. Also, during the period from 2004–2006, the main channel adjacent to the former SWM facility was dredged to -53 ft MLLW as part of POLA's Main Channel Deepening Project (MCDP) (Figure 1). No other dredging has occurred in the vicinity of the former SWM site since before 1990.

The POLA has an approved plan to fill the dry dock slips (within Parcel 4) as part of the next phase of the Channel Deepening project to create a confined disposal facility (CDF). As part of the MCDP, the proposed CDF will accommodate placement of contaminated sediments which have been characterized as unsuitable for open water disposal. Containment structure construction for the CDF will require dredging of the area between the containment structure and the existing limit of the -53 ft MLLW channel which will also be placed within the CDF (Figure 1). This proposed project will result in the formation of eight acres of new land for future port-related use. Construction of the CDF will also result in capping of existing contamination in the dry dock slips.

Based on the POLA's plan to fill the former dry dock slips within Parcel 4 in conjunction with the MCDP, the current sediment investigation was focused only on characterization of sediment adjacent to Parcels 5 and 6 (Berths 240X, Y, and Z) and throughout the Berth 240 Slip. This sampling was designed to assess data gaps from previous sampling and analyses conducted in the Berth 240 Slip, as discussed in Subsection 1.2 below, and to address recommendations from the DTSC, Human and Ecological Risk Division (HERD). A Remedial Investigation Workplan (RIW) addressing landside contamination on the former SWM Facility (985 Seaside Avenue, Terminal Island, California) was prepared by the Source Group, Inc. (SGI) for the POLA, and subsequently submitted to the DTSC on March 19, 2009. DTSC (HERD) reviewed the workplan on May 14, 2009, and recommended that additional information be collected to assess the

relationship between landside and waterside contamination, with an ultimate goal being the determination of ecological risk at the site.

As part of a subsequent meeting on May 18, 2009, between POLA and HERD, it was agreed that the POLA would prepare a sampling and analysis plan (SAP) for purposes of further characterizing sediment contamination along Berths 240 X, Y, and Z. A draft SAP (submitted on June 11, 2009) was reviewed by HERD and comments provided to the POLA on August 19, 2009. In addition to characterizing the area immediately adjacent to Berths 240 X, Y, and Z (along the east side of the Berth 240 Slip) and assessing the nexus between landside and waterside contamination, DTSC requested that additional samples be collected on the west side of the Berth 240 Slip such that the extent of contamination within the slip could be better delineated. DTSC also requested that testing for polycyclic aromatic hydrocarbons (PAHs) be conducted at all stations. In addition to HERD's comments, the Contaminated Sediments Task Force (CSTF) was engaged at this stage of the project, given their routine involvement with sediment contamination issues at the Port and throughout the Los Angeles region. The POLA presented a SAP at the CSTF meeting on September 23, 2009 that addressed earlier comments from HERD. At this meeting, CSTF members raised questions regarding sample density and station location placement. To address these questions, the POLA performed additional statistical analyses to establish the appropriate sample number and provide suggested placement of additional sampling locations for characterization of the project area. They presented results of this analysis and the revised sampling locations at the January 27, 2010 CSTF meeting (details are provided in Subsection 1.4). The SAP was subsequently revised to include additional comments from the CSTF and ultimately approved on April 5, 2010. Field sampling was conducted between April 29, 2010, and May 5, 2010. This report presents results of this most recent sediment sampling effort and incorporates historical data collected from Berths 240X, Y, and Z over the last five years in the analysis and discussion.

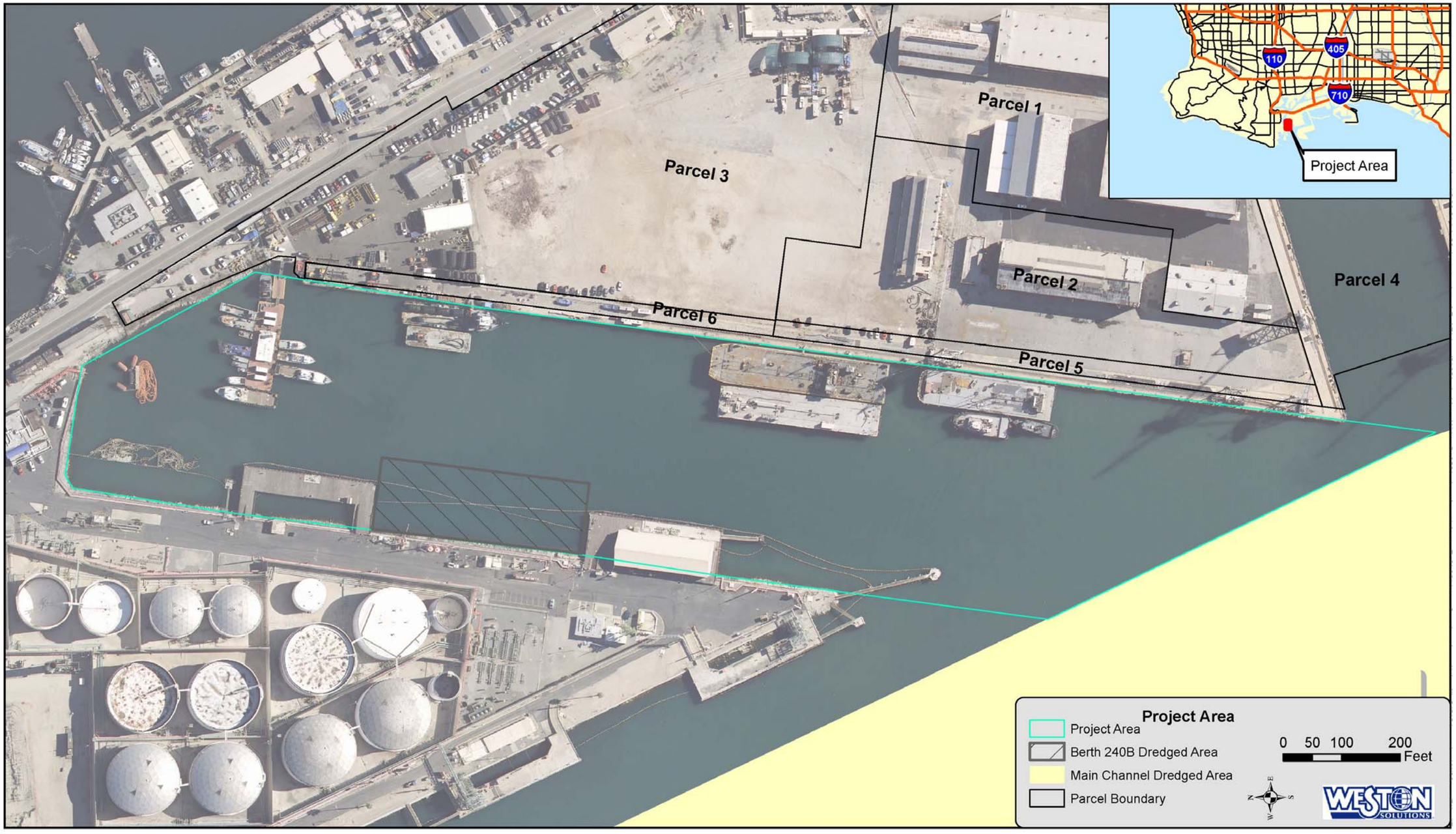

Figure 1. Berth 240 Slip and Berths 240X, Y, and Z Project Area, Port of Los Angeles

1.2 Previous Studies

Previous environmental studies have been conducted in the former SWM leasehold area, for both landside and waterside areas. An overview of the landside studies is provided below, followed by a detailed review of previous sediment investigations.

Recent studies of the landside portion of the leasehold found elevated levels of total petroleum hydrocarbons (TPHs), polychlorinated biphenyls (PCBs), and metals (e.g., lead, copper, and chromium) in soil and/or groundwater at select locations within the leasehold (SGI, 2007). TPH was elevated in soil (more than 1,000 milligram per kilogram (mg/kg)) and groundwater (more than 1,000 microgram per liter (µg/L)) near the former diesel tank on the north end of Parcel 1; in soil at the former abrasive blasting grit containment area on the south end of Parcel 1; and in soil and groundwater near former oil storage areas within Parcel 2. PCBs were elevated (more than 6.2 mg/kg) in soil on the west side of Parcel 3 and in one small area within the northwest portion of Parcel 2. Additionally, recent studies detected very low concentrations of tributyltin (TBT) in soil (0.0008–0.009 mg/kg), in comparison to a previous study that measured TBT soil concentrations as high as 55 mg/kg in the central portion of Parcel 2 (SGI, 2006).

On the waterside portion of the leasehold, SWM analyzed three sediment samples collected from the ends of piers 1, 2, and 3 within Parcel 4 (2002) for arsenic, chromium, copper, nickel, lead, zinc, and total organic carbon (TOC). All metal concentrations were below their respective effects range–median (ER-M) values, suggestive of a lower probability of potential toxicity to benthic biota. However, the study was intended as an initial reconnaissance and was not designed to delineate spatial distribution of contaminants within the site. In addition, organic contaminants were not investigated as part of SWM's 2002 investigation. Consequently, the POLA requested that Weston Solutions, Inc. (WESTON®) evaluate the spatial (i.e., horizontal and vertical) distribution of sediment contamination within and adjacent to the SWM leasehold area. Results of this study indicated that there were elevated concentrations of a number of sediment-associated contaminants within and adjacent to the SWM leasehold area (WESTON, 2005). Data from the 2005 investigation were interpolated using an inverse distance-weighted geographic information system (GIS) method and a series of maps were generated to illustrate the spatial distribution of sediment-associated contamination within the leasehold. These spatial distributions were based on comparisons to total threshold limit concentration (TTLC) exceedances, ER-M exceedances, and exceedances of the Long Beach Naval Station copper cleanup goals (WESTON, 2006). Overall, this data interpolation had limited confidence due to large distances between sediment station locations within and adjacent to the SWM leasehold area. It was determined that additional sediment sampling and characterization was necessary to obtain higher resolution in mapping of sediment contaminant distributions.

In 2007, WESTON collected 20 additional sediment core samples within Parcel 4 of the SWM leasehold area and 26 additional sediment core samples along the wharf-face of Parcels 5 and 6 and offshore of Parcel 4 (WESTON, 2007). Parcels 5 and 6 are narrow stretches of land along Berths 240X, Y, and Z; therefore, stations adjacent to Parcel 5 and Parcel 6 are in the vicinity of the sampling area for this project. Fifteen stations (SWM45–SWM59) were located adjacent to Parcel 5. Stations adjacent to Parcel 5 (SWM49–SWM53) demonstrated the highest concentrations of contaminants. In this area, there were multiple metals (i.e., copper, lead, mercury, and zinc) with ER-M exceedances at multiple depths. At a few depth intervals there

were TTLC exceedances for lead, mercury, and zinc. The only organochlorine pesticide detected was the dichlorodiphenyltrichloroethane (DDT) derivative 4,4'-DDE, which exceeded its ER-M at six of the 15 stations in this sampling area. TBT and other organotins were detected adjacent to Parcel 5 with six stations demonstrating TBT concentrations above 100 micrograms per kilogram (µg/kg).

Seven stations (SWM40 and SWM60–SWM65) were located adjacent to Parcel 6. At four of the seven stations in this area (SWM40, SWM62, SWM64, and SWM65), concentrations of several metals (i.e., copper, lead, mercury, and zinc) consistently exceeded ER-M values in surface and multiple depth intervals. In addition, several depth intervals demonstrated TTLC exceedances for mercury and lead. The only organochlorine pesticides detected were the DDT derivatives 4,4'-DDD and 4,4'-DDE. In this area 4,4'-DDE exceeded its ER-M value at four stations. TBT concentrations were elevated above 100 µg/kg at five of seven stations in this area.

PCB congeners were not initially analyzed in these samples; however, because of subsequent concern regarding a potential link between landside PCB contamination (SGI, 2007), archived surface (0–2 ft) core segments were recently analyzed for PCB congeners at stations SWM40, SWM52, SWM54, SWM59, and SWM61–SWM65. Results indicated that concentrations of total PCB congeners were below effects range–low (ER-L) values at SWM59 and below the ER-M value at SWM61. Total PCB congeners were significantly elevated above ER-M values at stations SWM62–SWM65 (two to three times) and at station SWM 40, SWM52, and SWM54 (four to 11 times).

1.3 Sampling and Testing Objectives

The objectives of this study were as follows:

- Further delineate the spatial (i.e., horizontal and vertical) distribution of sediment contamination along Berths 240X, Y, and Z and within the entire Berth 240 Slip area;
- Further evaluate the nexus between landside contamination and sediment quality impacts on the adjacent waterside portion of Berths 240X, Y, and Z.

1.4 Selection of Station Locations

As discussed previously, station locations in this study were selected to 1) delineate contamination within the Berth 240 Slip, thus supplementing data from previous studies conducted by WESTON (2005; 2007), and to 2) investigate a linkage to landside contamination by sampling near storm drain outfalls and under the wharf face along Berths 240X, Y, Z.

1.4.1 Data Gaps

1.4.1.1 Previously Unsampled Areas

Sediment cores were collected in areas of the Berth 240 Slip where there was no historical data (i.e., locations within the slip were selected to provide for greater spatial coverage, specifically at the north end of the wharf face and in the area between the slip and the main channel dredged area). These data were combined with results from the 2005 and 2007 studies to provide higher resolution in the mapping of sediment contaminant distributions (Section 4.0). Upon completion of this study, 57 stations were used in spatial presentation of sediment chemistry results.

Due to concerns raised at the September 23, 2009 CSTF meeting, in regard to sample density and coverage in the POLA's draft SAP for the Berth 240 Slip, sample density and placement were statistically evaluated using the United States Environmental Protection Agency (USEPA)-recommended software Visual Sampling Plan (VSP), Version 5.4.2, (Battelle Memorial Institute). VSP is a data-quality-objectives-based systematic planning software that uses statistics to determine a number and location of samples/transects. Prior to using VSP, GIS was used to determine the size of the area to be sampled and characterized for sediment contamination. Berth 240 Slip area is approximately 512,000 ft^2 (i.e., 11.8 acres), excluding the area recently dredged at Berth 240B, two floating docks adjacent to Berth 240B, and the area immediately along the Berths 240X, Y, and Z wharf faces in which large numbers of samples have been previously collected. Assuming a desire to detect different hotspots (e.g., 5%, 7.5%, and 10%) within the overall project footprint at confidence intervals between 85–95% VSP was used to estimate the required number of samples. Assumptions for this analysis included that the shape of the sampling grid would be triangular (typically used grid), samples would be collected by vibracore, and potential hot spot(s) would be circular. Results of the VSP sample size estimation procedures are shown in Table 1.

Table 1. Determination of Sample Size to Characterize Sediments within Berth 240 Slip Based on a Systematic Triangular Grid Sample Placement

	Hot Spot Size (percent of Berth 240 Slip area)		
Probability of Finding a Hot Spot	**5%**	**7.5%**	**10%**
85%	18	12	9
90%	19	13	10
95%	21	14	11

Based on these results, it was agreed at the CSTF meeting (January 27, 2010) that 21 sampling locations across the slip was an appropriate number of station locations for characterization of the spatial extent of sediment contamination within the Berth 240 Slip. In addition to the four previously characterized stations (20–23) within the Berth 240 Slip, a total of 22 new stations were planned to be sampled in the slip and the area between the edge of the Berth 240 Slip and the Main Channel Dredged Area. Planned station locations were adjusted from the systematic triangular grid sampling design to account for shoals identified in the bathymetry data.

1.4.1.2 Previously Sampled Stations

As part of this investigation, sediments from five stations previously sampled in 2007 were selected for resampling and subsequent chemical analyses to further delineate the vertical extent of contamination at each station. Selected stations included SWM40, SWM49, SWM50, SWM53, and SWM65. In 2007, subsurface contamination was measured at these stations; however, the maximum depth of contamination was not established (WESTON, 2007). For three stations (SWM40, SWM53, and SWM65), elevated concentrations of metals and/or pesticides were measured in the deepest core segment analyzed (8–10 ft). Therefore it was proposed that these stations be resampled to analyze the 10–12 ft core horizon. For the other two stations (SWM49 and SWM50), elevated concentrations of metals and/or pesticides were previously measured in the 6–8-ft core segment but not in the 12–14-ft core segment, so resampling was proposed at those stations during the current study to analyze the 8–10-ft and 10–12-ft core horizons, respectively.

Two stations previously sampled in 2005 (SWM20 and SWM22) and one station previously sampled in 2007 (SWM64) were also selected for resampling to determine vertical extent of contamination at each station. Subsurface contamination was measured at the deepest horizon collected and therefore the maximum depth of contamination was not established (WESTON, 2005; WESTON, 2007). For stations SWM20 and SWM22, elevated concentrations of metals, pesticides, and/or PAHs were measured in the deepest core segment analyzed (4–6 ft and 2–5 ft, respectively). For station SWM64, elevated concentrations of metals were measured in the deepest core segment analyzed (10–12 ft). These stations were selected for resampling to the maximum depth achievable.

1.4.2 Potential Landside–Waterside Contamination Nexus

1.4.2.1 Stations Adjacent to Storm Drain Outfalls

Four stations adjacent to storm drain outfalls along Berths 240X, Y, and Z were selected to investigate the relationship between known landside contamination to sediment contamination near and at increasing distance from the outfalls. Two outfalls were selected based on their proximity to metal, PCB, and TPH landside contamination (SGI, 2007) as well as results of recent analyses of PCB congeners at selected waterside sediment sampling locations sampled and archived in 2007. Results from the 2007 study indicated low concentrations of total PCBs at stations SWM59 and SWM61, but elevated concentrations at stations SWM40, SWM52, SWM54, and SWM62–SWM65. Stations were placed within 50 ft and/or 100 ft of the storm drain outfall. Results were analyzed by performing statistical correlations to determine the relationship between concentrations of each analyte versus distance from each storm drain.

1.4.2.2 Stations under the Wharf

During previous sediment characterization studies along Berths 240X, Y, and Z, sampling was focused on determining spatial extent of sediment contamination in an area adjacent to the wharf. However, there is an area under the wharf (and essentially overlying a slope of crushed rock) that may provide information regarding potential linkage to landside contamination. Specifically, this area might be affected by groundwater leachate through sediment and/or crushed rock below the wharf, non-point source runoff from the wharf surface, or runoff directly from the storm drain outfall. For this evaluation, divers collected push cores of surface sediment (less than 2 ft) at three stations (SWM88, SWM89, and SWM90) under the wharf or as close to the wharf face as possible. Based on historical as-built drawings from the POLA, crushed stone was placed to stabilize the slope leading away from the wharf face in the southern most area along Berths 240X, Y, and Z. For the station placed in this location (SWM88), samples were collected at the edge of the crushed stone as close to the wharf face as possible. For the remaining two stations (SWM89 and SWM90), samples were collected directly under the wharf at the edge of the wharf face where the material was a sandy-silt. Two of the three diver core stations were also located near storm drain outfalls (SWM89 and SWM90).

1.4.3 Summary of Sampling Locations

Figure 2 shows all of the station locations for this project. Stations to assess sediment chemistry data gaps within the Berth 240 Slip and along Berths 240X, Y, and Z together with the station locations for assessing the potential link between landside and sediment contamination along Berths 240X, Y, and Z are shown.

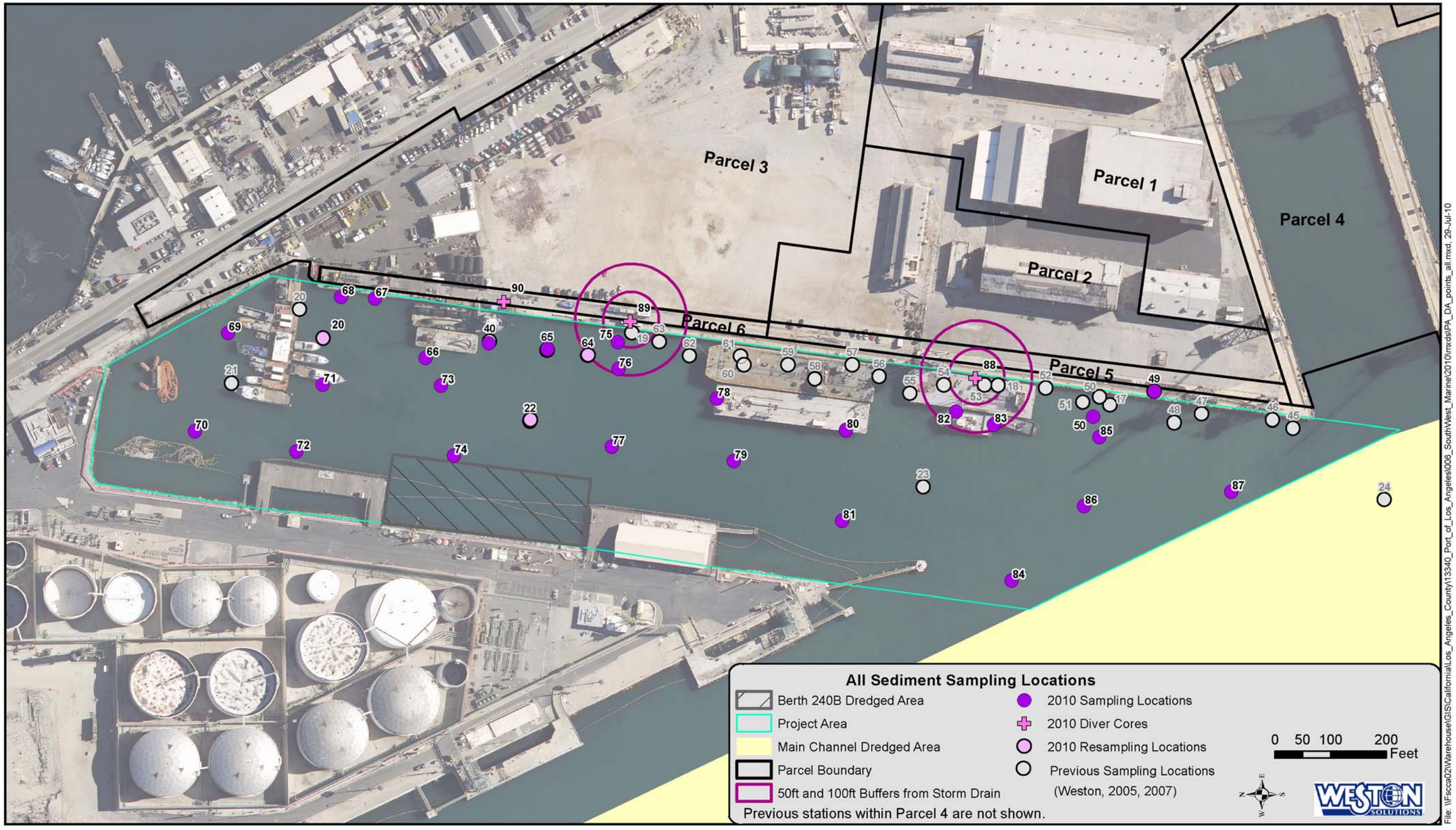

Figure 2. Sampling Locations for Sediment Cores Collected at Berths 240X, Y, and Z Project Area, Port of Los Angeles, 2005–2010

2.0 MATERIALS AND METHODS

2.1 Field Collection Program

Sediment core samples were targeted for collection at 33 stations in the vicinity of Berths 240X, Y, and Z (Figure 2). A vibracore was used to sample 29 stations and three stations were sampled using diver collected push cores. One station (SWM53) could not be sampled due to the presence of rocks and cobble at five feet below the sediment surface (targeted sampling depth at this station was greater than six feet).

2.1.1 Station Locations and Depths

With the exception of station SWM64, target penetration depth for vibracore samples was 15 ft below the sediment surface (assuming refusal was not encountered) at 29 locations in the vicinity of Berths 240X, Y, and Z (Figure 2). At station SWM64, target penetration depth for the vibracore sample was 20 ft below the sediment surface (assuming refusal was not encountered) due to ER-M exceedances for metals in the 10–12-ft core at that site in the 2007 study (WESTON, 2007). Target penetration depth for diver core samples was 2 ft below the sediment surface (or maximum depth achievable) at three stations along Berths 240X, Y, and Z. The planned number of cores, station identification (ID), latitude and longitude coordinates, and target core lengths are provided in Table 2.

Table 2. Planned Number of Cores, Station Identification, Geographic Coordinates, and Target Core Lengths for Subsurface Samples Collected in the Vicinity of Berths 240X, Y, and Z

Station ID	Description	Latitude (WGS 84)	Longitude (WGS 84)	Target Core Length (ft)
SWM20	Resample for contaminant delineation at 6–8 ft	33.735200	-118.270634	15
SWM22	Resample for contaminant delineation at 5–7 ft	33.734060	-118.271282	15
SWM40	Analysis of 10–12 ft archived core horizon (or resample)	33.731840	-118.271094	NA (18)
SWM49	Analysis of 8–10 ft, 10–12 ft archived core horizon (or resample)	33.731272	-118.271161	NA (15)
SWM50	Analysis of 8–10 ft, 10–12 ft archived core horizon (or resample)	33.731006	-118.271130	NA (15)
SWM53	Analysis of 10–12 ft archived core horizon (or resample)	33.734273	-118.270844	NA (15)
SWM64	Resample for contaminant delineation at 12–14 ft	33.733778	-118.270902	20
SWM65	Analysis of 10–12 ft archived core horizon (or resample)	33.733979	-118.270867	NA (18)
SWM66	Data gap – for improved spatial delineation	33.734471	-118.270734	15
SWM67	Data gap – for improved spatial delineation	33.734728	-118.270662	15
SWM68	Data gap – for improved spatial delineation	33.734999	-118.270574	15
SWM69	Data gap – for improved spatial delineation	33.735555	-118.270789	15
SWM70	Data gap – for improved spatial delineation	33.735897	-118.271351	15
SWM71	Data gap – for improved spatial delineation	33.735088	-118.271092	15

Table 2. Planned Number of Cores, Station Identification, Geographic Coordinates, and Target Core Lengths for Subsurface Samples Collected in the Vicinity of Berths 240X, Y, and Z

Station ID	Description	Latitude (WGS 84)	Longitude (WGS 84)	Target Core Length (ft)
SWM72	Data gap – for improved spatial delineation	33.735224	-118.271535	15
SWM73	Data gap – for improved spatial delineation	33.734507	-118.271096	15
SWM74	Data gap – for improved spatial delineation	33.734443	-118.271505	15
SWM75	Data gap / surface core within 50 ft of storm drain – for evaluation of potential storm drain outfall gradient	33.733637	-118.270837	15
SWM76	Data gap / surface core within 100 ft of storm drain – for evaluation of potential storm drain outfall gradient	33.733590	-118.271026	15
SWM77	Data gap / surface core within 100 ft of storm drain – for evaluation of potential storm drain outfall gradient	33.733597	-118.271529	15
SWM78	Data gap – for improved spatial delineation	33.733217	-118.271162	15
SWM79	Data gap – for improved spatial delineation	33.732908	-118.271572	15
SWM80	Data gap – for improved spatial delineation	33.732480	-118.271309	15
SWM81	Data gap – for improved spatial delineation	33.732544	-118.271980	15
SWM82	Data gap – for improved spatial delineation	33.731973	-118.271239	15
SWM83	Data gap / surface core within 100 ft of storm drain – for evaluation of potential storm drain outfall gradient	33.731789	-118.271315	15
SWM84	Data gap – for improved spatial delineation	33.731699	-118.272230	15
SWM85	Data gap – for improved spatial delineation	33.731269	-118.271386	15
SWM86	Data gap – for improved spatial delineation	33.731344	-118.271792	15
SWM87	Data gap – for improved spatial delineation	33.730622	-118.271706	15
SWM88	Diver core under wharf – for evaluation of landside–waterside nexus	33.731880	-118.271043	2
SWM89	Diver core under wharf – for evaluation of landside–waterside nexus	33.733578	-118.270714	2
SWM90	Diver core under wharf – for evaluation of landside–waterside nexus	33.734209	-118.270594	2

One core per location was sufficient to ensure an adequate volume of material (approximately 2 L) for all required testing and archival. Cores were split into 2-ft vertical segments (i.e., 0–2 ft, 2–4 ft, 4–6 ft, etc.) to assess vertical resolution of potential chemical contamination. Samples from each vertical segment were analyzed separately according to the phased approach discussed in Subsection 2.4.1. At all diver core stations, only surface sediment (0–2 ft) was collected and analyzed.

2.1.2 Navigation

All subsurface sediment station locations were pre-plotted (Table 2 and Figure 2). Locations were determined using a Garmin e-trex Differential Global Positioning System (DGPS) receiving differential corrections from the Federal Aviation Administration (FAA) wide area augmentation system (WAAS). The system used United States Coast Guard differential correction data and was accurate within 10 ft. Due to suspect DGPS information associated with possible differential failure during a portion of the sampling activities, several stations (SWM40, SWM49, SWM65, SWM69, SWM75, SWM76, SWM84, SWM85, and SWM87) were located using visual line-ups. Due to rocks and debris in the area, two stations (SWM20 and SWM50) were relocated slightly from their location in the 2007 study. All final station locations were recorded in the field using positions from the DGPS or through line-ups on the field map.

2.1.3 Sediment Collection and Handling

Cores were collected in all areas accessible by boat using an electric vibracore (Figure 3). The vibracore was deployed from the *M/V Early Bird II*, a vessel modified for environmental sampling and owned and operated by Seaventures. The vibracore was equipped with a 4-inch outer diameter aluminum barrel and stainless-steel catcher to retain sediment. The standard system is capable of collecting cores up to approximately 20 ft long, which is more than sufficient to cover the target core lengths identified for this project (Table 2). A new polyethylene liner was inserted into the tube prior to sampling at each station to eliminate the possibility of cross contamination. Following sampling, the vibracore was retrieved to the deck of the boat and the liner containing the sediment core was removed from the aluminum tube and placed in a core tray for processing. The liner was cut vertically along the length of the sediment core and a qualified scientist examined and classified the sediment as well as photographed the sediment core. The core stratigraphy, sediment grain-size distribution, color, texture, and other pertinent sediment characteristics were logged according to the Unified Soil Classification System (USCS).

Sediment vibracore samples were collected to a target sampling depth unless refusal was encountered. Refusal was defined as less than two inches of penetration per minute. If refusal was encountered, the vessel was moved and a second core attempted. If refusal was encountered again, additional cores were not attempted unless operational problems were suspected.

Diver collected push cores were collected in areas inaccessible by boat. This included three sample locations directly under the wharf or at the base of the crushed rock along the wharf face. Divers used self-contained underwater breathing apparati (SCUBA) to access the sampling stations. Cores were collected using a 3-inch outer diameter polyethylene core tube. The core tube was advanced to a target sampling depth (unless refusal was encountered) and then sealed with end caps. Following sampling, the diver core was retrieved to the deck of the boat and placed vertically in a rack. The cores were secured and labeled. Each end cap was secured with duct tape. Once the sediment had settled within the core tube (approximately 20 minutes), the core length was measured and any apparent sediment characteristics logged. Water overlying the sediment within the core tube was drained by drilling a hole in the tube approximately 1-cm above the water–sediment interface.

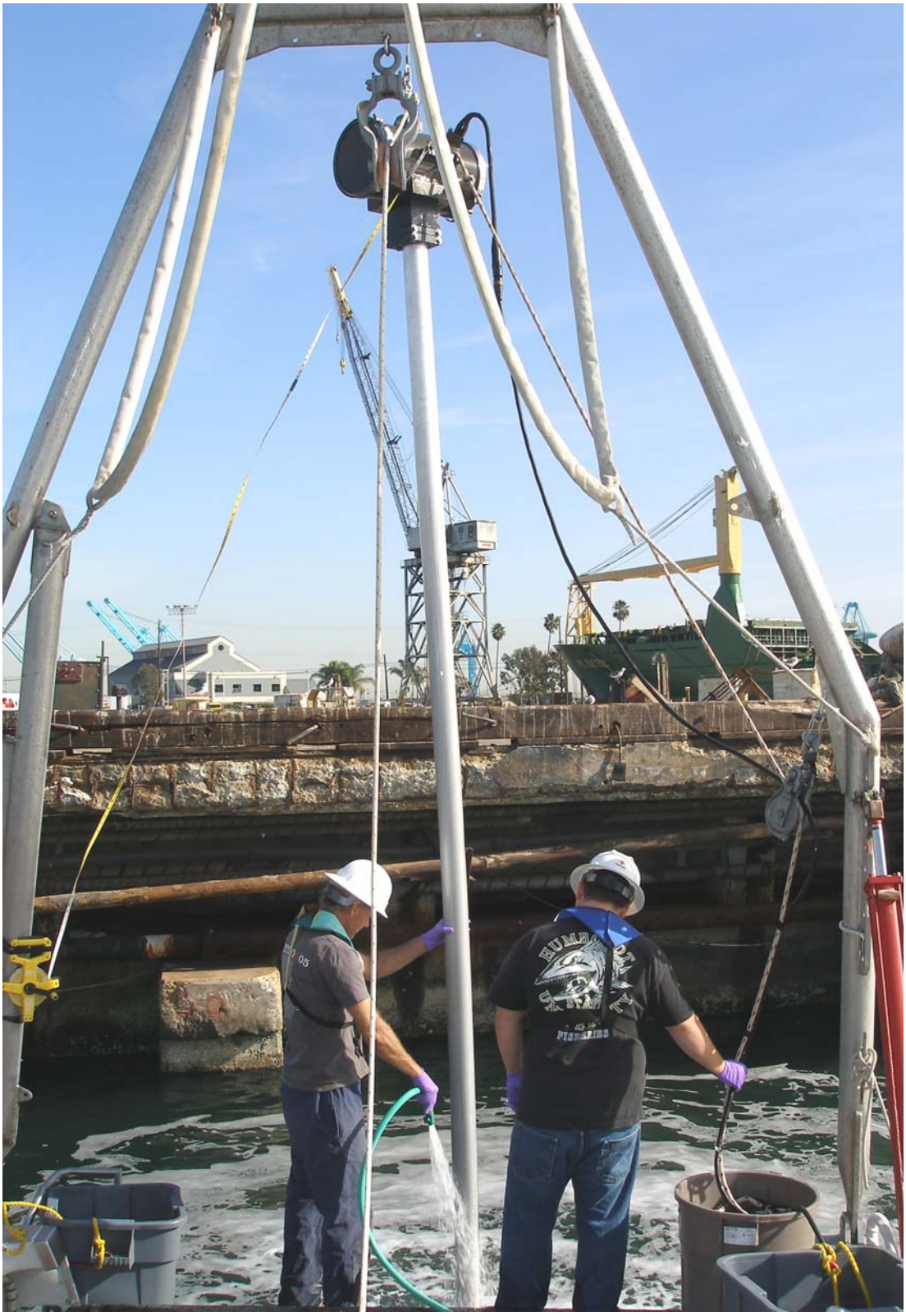

Figure 3. Vibracore Sampling along Berths 240X, Y, and Z, Port of Los Angeles

2.1.4 Sample Processing and Storage

All cores were processed on site on the sampling vessel. Sediment cores from each station were sectioned into 2-ft intervals. Each 2-ft core segment was homogenized to a uniform consistency using a stainless-steel mixing apparatus. Subsamples representing each 2-ft segment was placed in two certified-clean, 250-mL glass jars with Teflon-lined lids for chemical analysis and subsequent archival. Another subsample representing each 2-ft segment was placed in a Ziploc™ bag for grain-size analysis. Core segments not immediately analyzed in Phase I were archived in the event that further delineation of chemical contamination was required (see Subsection 2.4.1 discussion on the phased approach to chemical analyses). All samples were labeled with project name, date, sampler ID, analysis, and preservative where applicable; logged into a field chain-of-custody (COC) form (Appendix D); and placed into a cooler. Samples were stored in the dark on ice or at 4°C until shipped or delivered to the appropriate analytical laboratory. Upon delivery to the appropriate laboratory, archived samples were frozen.

2.1.5 Decontamination of Field Equipment

All vibracore equipment was cleaned prior to sampling. Between stations, core barrels and the deck of the vessel was rinsed with site water and new polyethylene core tube liners were used at each sample location. Before homogenizing each core segment, all stainless-steel utensils (i.e., stainless-steel bowls, spoons, spatulas, mixers, and other utensils) were cleaned with Alconox, rinsed with tap water, and rinsed three times with de-ionized water.

2.2 Shipping

Prior to delivery, chemistry samples were securely packed inside coolers with ice. COC forms were completed (Subsection 2.3), and original signed COC forms inserted in a sealable plastic bag and placed inside the cooler. Cooler lids were securely taped shut. Samples were delivered to the analytical laboratories listed in Table 3.

Table 3. Analytical Laboratories, Point-of-Contact Information, and Delivery Information

Laboratory	Analyses Performed	Point-of-Contact Information	Shipping Information
Weston Solutions, Inc.	Grain size, archival	Andrew Martin Sheila Holt (760) 795-6901	Weston Solutions, Inc. 2433 Impala Drive Carlsbad, California 92010
Calscience Environmental Laboratories, Inc.	Sediment chemistry	Danielle Gonsman (714) 895-5494 ext. 232	Calscience Environmental Laboratories, Inc. 7440 Lincoln Way Garden Grove, California 92841

2.3 Documentation of Chain of Custody

Samples were considered to be in custody if they were 1) in the custodian's possession or view, 2) retained in a secured place (under lock) with restricted access, or 3) placed in a secured container. Principal documents used to identify samples and to document possession were COC records, field log books, and field tracking forms. COC procedures were used for all samples throughout the collection, transport, and analytical process, and for all data and data documentation, whether in hard copy or electronic format.

COC procedures were initiated during sample collection. A COC record was provided with each sample or sample group. Each person who had custody of the samples signed the form and ensured that the samples were not left unattended unless properly secured. Minimum documentation of sample handling and custody included the following:

- Sample ID.
- Sample collection date and time.
- Any special notations on sample characteristics.
- Initials of the person that collected the sample.
- Date the sample was sent to the laboratory.
- Shipping company and waybill information.

A completed COC form was placed in a sealable plastic envelope that traveled inside the ice chest containing the listed samples. The COC form was signed by the person transferring custody of the samples. The condition of the samples was recorded by the receiver. COC records were included in the final analytical report prepared by the laboratory and were considered an integral part of that report.

2.4 Physical and Chemical Analyses

2.4.1 Phased Analytical Approach for Delineation of Sediment Chemical Contamination

Physical and chemical analyses of core samples were conducted in a phased approach. The intent of this method was to improve sampling efficiency by screening initial results to establish the extent of additional physical and chemical analyses required to fully delineate potential extent and magnitude of contamination. Phased analytical approaches for each sample type (i.e., data gap stations, previously sampled stations, stations near storm drain outfalls, and stations under the wharf) are described below.

2.4.1.1 Data Gaps

Physical and chemical analyses of data gap samples were conducted in a phased approach as depicted in Table 4. The first phase consisted of analyzing the 0–2-ft (surface) and 4–6-ft core segments of all stations. Results were evaluated in accordance with sediment quality objective (SQO) procedures using the California Logistic Regression Model (CA LRM) and the Chemical Score Index (CSI) to determine a final chemistry line-of-evidence (LOE) category. Phase II consisted of two separate scenarios. In the first scenario (Phase IIa), core segment 2–4 ft was

analyzed if sediment contaminant concentrations resulted in a sediment chemistry LOE category of moderate or high exposure in the 0–2-ft core segment but not in the 4–6-ft core segment. In the second scenario (Phase IIb), core segment 6–8 ft was analyzed if sediment contaminant concentrations resulted in a sediment chemistry LOE category of moderate or high exposure in the 4–6-ft core segment. No additional core segments were analyzed if both the 0–2-ft and 4–6-ft core segments resulted in categories of minimal or low exposure. A third phase was implemented when results from Phase IIb indicated that additional sediment characterization was warranted. Consultation with the POLA regarding the extent of Phase III was conducted prior to the initiation of Phase III analyses, which involved analysis of 8-ft and deeper core horizons to the depths at which contaminants resulted in sediment chemistry LOE categories of minimal or low exposure.

Table 4. Phased Approach to Physical and Chemical Analyses for Individual Core Segments Collected in Areas of Data Gaps

Core Segment (ft)	Phased Analyses
0–2	
2–4	
4–6	
6–8	
8+	

	Phase I	Initial analyses
	Phase IIa	If sediment chemistry LOE category of moderate or high exposure in the 0–2-ft segment and not in 4–6-ft segment
	Phase IIb	If sediment chemistry LOE category of moderate or high exposure in the 4–6-ft segment
	Phase III	As necessary, after consultation

2.4.1.2 Previously Sampled Stations

Physical and chemical analyses of previously sampled stations were conducted in a phased approach as depicted in Table 5. For stations SWM40, SWM53, and SWM65, the first phase consisted of analyzing the 10–12-ft core segment. Additional core segments were analyzed when contaminant concentrations in the 10–12-ft core resulted in a sediment chemistry LOE category of moderate or high exposure. No additional core segments were analyzed when contaminant concentrations in the 10–12-ft core segment resulted in a category of minimal or low exposure.

For stations SWM49 and SWM50, the first phase consisted of analyzing the 8–10-ft core segment. When sediment contaminant concentrations resulted in a sediment chemistry LOE category of moderate or high exposure in the 8–10-ft core segment, the 10–12-ft core segment was analyzed in the second phase. No additional core segments were analyzed if contaminant concentrations in the 8–10-ft core segment resulted in a category of minimal or low exposure.

For stations SWM20 and SWM22, the first phase consisted of analyzing the 6–8-ft and 5–7-ft core segments, respectively, based on elevated chemistry in previous testing. When sediment contaminant concentrations resulted in a sediment chemistry LOE category of moderate or high exposure in the 6–8-ft or 5–7-ft core segments, the 8–10-ft or 7–9-ft core segments were

analyzed in the second phase. A third phase (over 9 ft) was implemented after consultation with POLA when results of Phase II inferred additional sediment characterization was warranted.

For station SWM64, the first phase consisted of analyzing the 12–14-ft core segment. When sediment contaminant concentrations resulted in a sediment chemistry LOE category of moderate or high exposure in the 12–14-ft core segment, then the 14–16-ft core segment was to be analyzed in the second phase.

Table 5. Phased Approach to Physical and Chemical Analyses for Further Delineation of Contamination in Previously Sampled Stations

Core Segment (ft)	Phased Analyses for SWM40, SWM53, and SWM65	Phased Analyses for SWM49 and SWM50	Phased Analyses for SWM20 and SWM22*	Phased Analyses for SWM64
6–8	NA	NA		NA
8–10	NA			NA
10–12				NA
12–14		NA	NA	
14–15/16		NA	NA	
>16 ft				

*For station SWM22, Phase I consists of analyzing the 5–7 ft core segment, Phase II consists of analyzing the 7–9-ft core segment, and Phase III consists of analyzing the 9–11-ft core segment.

	Phase I	Initial analyses
	Phase II	If sediment chemistry LOE category of moderate or high exposure in Phase I
	Phase III	When necessary, after consultation
NA	Not Analyzed	Analysis was not conducted based on previous chemical results from 2007

2.4.1.3 Stations Adjacent to Storm Drain Outfalls

Physical and chemical analyses of stations near storm drains were designed to link surface sediment concentrations to landside contamination. Therefore, only Phase I analysis (surface depth layer 0–2 ft) was used to assess the potential contamination from the storm drains to sediments at these four stations. Deeper core segments at those stations were analyzed as data gap stations.

2.4.1.4 Stations under the Wharf

For diver collected cores in areas under the wharf or at the edge of the crushed stone under the wharf, only surface (0–2 ft) samples were collected and chemically analyzed during Phase I.

2.4.2 Physical Analyses

Physical analyses of the surface and subsurface sediment included grain size and total solids (Table 6). Grain size was analyzed to determine the general size classes that made up the sediment (e.g., gravel, sand, silt, and clay). Grain size was conducted using the gravimetric procedure described in Plumb (1981). Total solids were measured to convert concentrations of

the chemical parameters from a wet-weight to a dry-weight basis. Total solids were determined by Standard Method (SM) 2540B (APHA, 1998).

2.4.3 Chemical Analyses

Chemical parameters measured in this testing program were selected to provide data on potential chemicals of concern in surface and subsurface sediments along Berths 240X, Y, and Z. All analytical methods used to obtain contaminant concentrations followed USEPA or SM procedures. Specific sediment analyses and target detection limits were specified in the SAP developed for this project (WESTON, 2010).

Analyses for priority pollutant metals (except mercury) were conducted using inductively coupled plasma/mass spectrometry (ICP/MS) in accordance with USEPA 6020. Mercury analysis was conducted using cold vapor atomic absorption spectrometry (CVAAS) in accordance with USEPA 7471A. PAHs were analyzed using gas chromatography/mass spectrometry (GC/MS) with selective ion monitoring (SIM) in accordance with USEPA 8270C.

TOC, composed of volatile and nonvolatile organic compounds, was determined using the Lloyd Kahn method (USEPA, 1988). This procedure involved treating sediment with hydrochloric or sulfuric acid to dissolve inorganic carbon (i.e., carbonates and bicarbonates) prior to TOC analysis using USEPA 9060A. Organochlorine pesticides were analyzed using gas chromatography/electron capture detection (GC/ECD) according to USEPA 8081A. PCB congeners were analyzed using GC/MS SIM according to USEPA Method 8270C. This method followed serial extraction with methylene chloride and alumina and gel permeation column cleanup procedures. TBT and its derivatives were analyzed by GC/MS according to Krone et al. (1989), following a cleanup procedure with methylene chloride extraction and Grignard derivatization.

2.4.4 Quality Assurance / Quality Control

Quality assurance (QA) objectives for chemical analysis conducted by the participating analytical laboratories are detailed in their laboratory QA manual(s). These objectives for accuracy and precision involved all aspects of the testing process, including the following:

- Methods and standard operating procedures (SOPs).
- Calibration methods and frequency.
- Data analysis, validation, and reporting.
- Internal quality control (QC).
- Preventive maintenance.
- Procedures to ensure data accuracy and completeness.

Results of all laboratory QC analyses were reported with the final data submittals. Any QC samples that failed to meet the specified QC criteria in the methodology or quality assurance project plan (QAPP) were identified and the corresponding data were appropriately qualified. All QA/QC records for the various testing programs are kept on file for review by regulatory agency personnel.

2.5 Data Review, Management, and Analysis

2.5.1 Data Review

All data were reviewed and verified by participating team laboratories to determine whether all data quality objectives were met and that appropriate corrective actions had been taken, when necessary.

2.5.2 Data Management

All laboratories supplied analytical results in both hard copy and electronic formats. Laboratories had the responsibility of ensuring that both forms were accurate. After completion of the sediment data review by participating team laboratories, hard copy results were placed in the project file at WESTON, and the results in electronic format were imported into WESTON's database system.

2.5.3 Data Analysis

Chemical contamination of subsurface sediments along Berths 240X, Y, and Z were assessed using two methods, the CSI and CA LRM, as specified in the *Water Quality Control Plan for Enclosed Bays and Estuaries* (SWRCB and USEPA, 2009).

3.0 RESULTS

3.1 Sediment Sample Collection and Handling

Vibracore sampling was conducted from April 29, 2010 to May 5, 2010. Sampling was conducted under clear skies on calm seas. Winds were generally light, with speeds increasing to 25 to 30 knots on the afternoons of April 29, 2010, and April 30, 2010.

Field GIS coordinates, number of cores per station, depth of penetration relative to the mudline (i.e., the sediment surface), depth of recovery relative to the mudline, and core length retained for each station location are summarized in Table 6. Due to refusal, samples were not collected at stations SWM53 (refusal depth of 10–12 ft), SWM64 (refusal depth of 14–16 ft), SWM67 (refusal depth of 4–6 ft), SWM80 (refusal depth of 4–6 ft), and SWM83 (refusal depth of 4–6 ft). Actual length of cores differed from the target core length at other stations due to differences in actual (i.e., observed) bathymetry and bathymetry from historical surveys used to calculate the target core lengths. Sample stratification by sediment type, color, and odor were recorded on sediment coring logs for each station. These field core logs, core photos, and other associated documentation for the sampling effort are provided in Appendix A. Figure 4 shows the final station locations as determined in the field for the Berths 240X, Y, and Z.

3.1.1 Diver Cores

Table 6 presents the field GIS coordinates, number of cores per station, depth of penetration relative to the mudline, depth of recovery relative to the mudline and core length retained for each diver core station. Divers collected push cores of surface sediment at stations SWM88, SWM89, and SWM90 under the wharf or as close to the wharf face as possible. Refusal occurred between 1.0–1.5 ft at these stations due to large rocks and concrete slabs extending offshore from the wharf. Field core logs, core photos, and other associated documentation are provided in Appendix A.

3.1.2 Archived Cores

Samples were not collected during this sampling effort at stations SWM40 and SWM49 due to vibracore refusal. Final core lengths at these stations were 12.0 ft and 0 ft, respectively. Archived sediment samples from the 2007 sampling effort were analyzed for SWM40 (12–14 ft and 14–15 ft samples) and for SWM49 (8–10 ft and 12–14 ft samples) (WESTON, 2007).

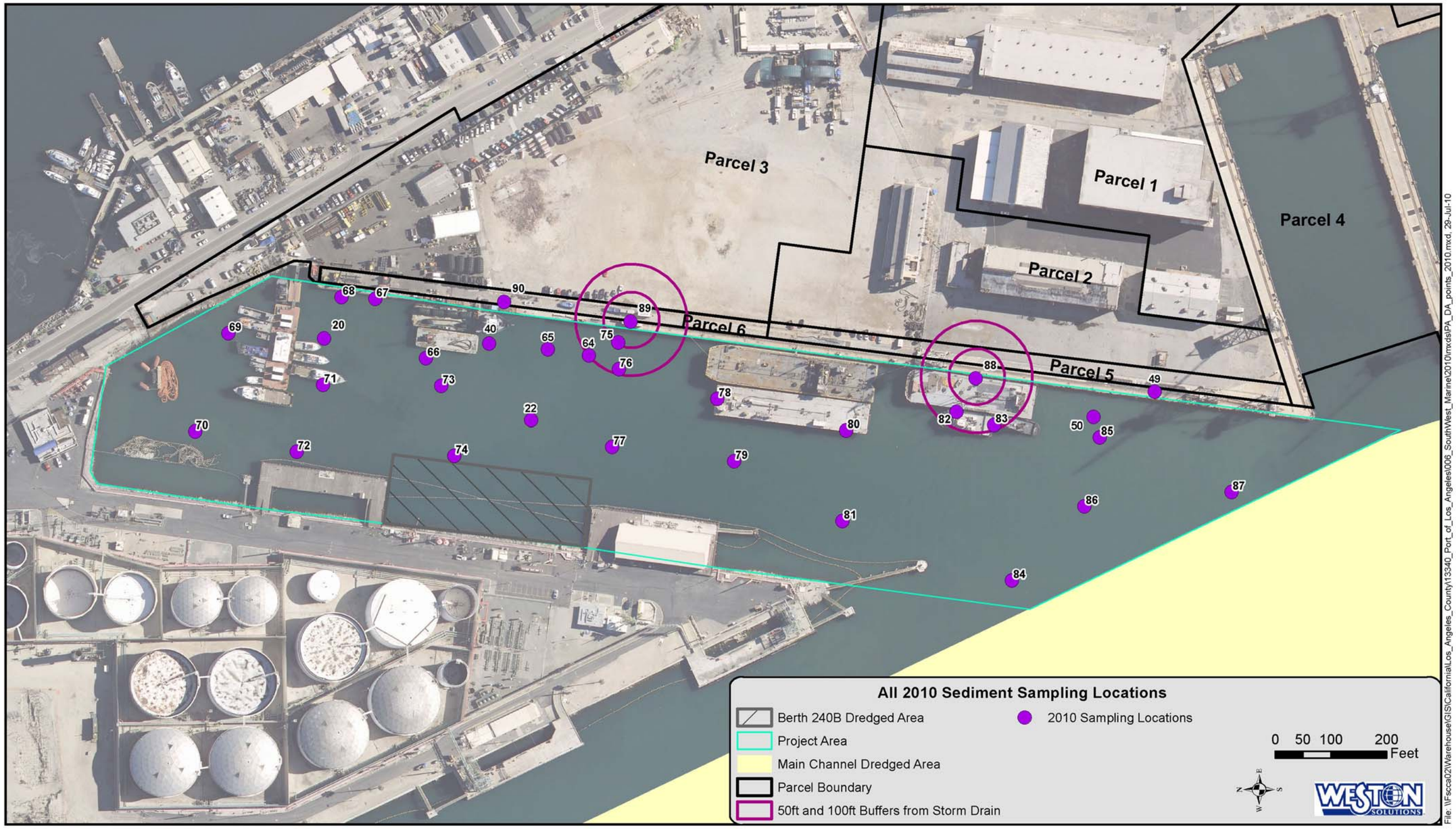

Figure 4. Final Sampling Locations for Sediment Cores Collected at Berths 240X, Y, and Z Project Area, Port of Los Angeles in 2010

Table 6. Field Coordinates and Sampling Depths of Sediment Core Samples at Berths 240X, Y, and Z Project Area, Port of Los Angeles

Station ID	Sample Date	Attempt	Latitude (WGS84) Degrees, Dec. Minutes	Longitude (WGS84) Degrees, Dec. Minutes	Water Depth MLLW (-ft)	Penetration (ft)	Target Core Length (ft)	Target Sampling Depth (-ft MLLW)	Actual Penetration Depth (-ft MLLW)	Core Length Retained for Processing and Analysis (ft)	Actual Sample Depth (-ft MLLW)	Comments
SWM20	**04/29/2010**	1	33°44.110	-118°16.239	19.6	5.0	15.0	34.6	24.6	5.0	24.6	Sample not collected, refusal at 5.0 ft due to cobble. Relocated for 2nd attempt.
		2	33°44.105	-118°16.249	30.9	13.0	15.0	45.9	43.9	12.0	42.9	SWM 20 moved slightly due to cobble along dock. Rock prevented further recovery.
SWM22	**05/01/2010**	1	33°44.047	-118°16.269	37.8	12.0	15.0	52.8	49.8	9.5	47.3	Rock prevented further recovery.
SWM40	**04/30/2010**	1	33°44.065	-118°16.257	37.0	5.0	18.0	55.0	42.0	0.0	37.0	Sample not collected, refusal at 4.0 ft due to debris. Will relocate at a later time.
		2	33°44.050	-118°16.256	36.4	5.0	18.0	54.4	41.4	4.0	40.4	Sample not collected. Will reattempt.
	05/04/2010	3	33°44.066	-118°16.249	34.4	14.5	18.0	52.4	48.9	12.0	46.4	Refusal at 14.5 ft.
SWM49	**05/04/2010**	1	33°43.861	-118°16.281	30.8	4.0	15.0	45.8	34.8	0.0	30.8	Sample not collected.
		2	33°43.863	-118°16.284	32.5	8.5	15.0	47.5	41.0	0.0	32.5	Sample not collected.
SWM50	**05/03/2010**	1	33°43.877	-118°16.272	27.0	5.5	15.0	42.0	32.5	0.0	27.0	Sample not collected, refusal at 5.5 ft due to large debris.
		2	33°43.878	-118°16.276	30.3	15.0	15.0	45.3	45.3	12.5	42.8	
SWM53	**05/04/2010**	1	33°43.909	-118°16.268	28.2	8.0	15.0	43.2	36.2	5.0	33.2	Rocks at 5.0 ft, refusal at 8.0 ft.
SWM64	**05/05/2010**	1	33°44.030	-118°16.253	35.1	18.0	20.0	55.1	53.1	14.0	49.1	Red paint observed from 5–8 ft in sediment. Rocks in tube at 4 ft below mudline prevented further recovery.
SWM65	**05/04/2010**	1	33°44.047	-118°16.252	35.0	14.0	18.0	53.0	49.0	11.0	46.0	Refusal at 14.0 ft.
SWM66	**04/30/2010**	1	33°44.075	-118°16.256	37.0	13.5	15.0	52.0	50.5	12.5	49.5	Potential native material, station moved due to vessels at original coordinates. Compact native material prevented further recovery.
SWM67	**05/01/2010**	1	33°44.090	-118°16.235	30.5	6.5	15.0	45.5	37.0	3.5	34.0	Refusal due to rocks along pier. Vessel blocked access to original coordinates.
	05/05/2010	2	33°44.090	-118°16.236	30.8	3.0	15.0	45.8	33.8	0.0	30.8	Refusal due to concrete or rocks along wharf.
SWM68	**04/29/2010**	1	33°44.100	-118°16.234	18.1	6.0	15.0	33.1	24.1	5.3	23.4	Refusal due to large rock or debris at 5.3 ft.
	05/05/2010	2	33°44.102	-118°16.236	21.6	3.0	15.0	36.6	24.6	0.0	21.6	1st attempt used. Refusal due to concrete or rocks along wharf.
SWM69	**05/01/2010**	1	33°44.131	-118°16.254	18.4	5.5	15.0	33.4	23.9	0.0	18.4	Refusal due to rock layer at 5.5 ft. Dates on photos are incorrect.
		2	33°44.131	-118°16.258	23.6	8.0	15.0	38.6	31.6	5.5	29.1	Refusal due to rock layer at 8.0 ft.
SWM70	**05/01/2010**	1	33°44.148	-118°16.281	24.6	15.5	15.0	39.6	40.1	0.0	24.6	No recovery due to rocks.
		2	33°44.143	-118°16.282	29.5	14.0	15.0	44.5	43.5	12.0	41.5	Refusal at 14.0 ft.
SWM71	**04/29/2010**	1	33°41.107	-118°16.259	30.4	8.0	15.0	45.4	38.4	7.5	37.9	Refusal at 8.0 ft. Station moved a few ft due to vessel blocking original location. Compacted clay prevented further recovery.
SWM72	**04/29/2010**	1	33°44.113	-118°16.289	31.9	15.0	15.0	46.9	46.9	13.0	44.9	
SWM73	**05/01/2010**	1	33°44.071	-118°16.268	37.8	14.5	15.0	52.8	52.3	11.5	49.3	Refusal at 14.5 ft. Dates on photos are incorrect.
SWM74	**05/01/2010**	1	33°44.072	-118°16.294	36.0	5.0	15.0	51.0	41.0	4.0	40.0	Sample not collected. Refusal at 5.0 ft. Dates on photos are incorrect.
		2	33°44.068	-118°16.269	35.2	15.0	15.0	50.2	50.2	12.0	47.2	Dates on photos are incorrect.
SWM75	**04/30/2010**	1	33°44.012	-118°16.256	32.5	15.0	15.0	47.5	47.5	12.0	44.5	

Table 6. Field Coordinates and Sampling Depths of Sediment Core Samples at Berths 240X, Y, and Z Project Area, Port of Los Angeles

Station ID	Sample Date	Attempt	Latitude (WGS84) Degrees, Dec. Minutes	Longitude (WGS84) Degrees, Dec. Minutes	Water Depth MLLW (-ft)	Penetration (ft)	Target Core Length (ft)	Target Sampling Depth (-ft MLLW)	Actual Penetration Depth (-ft MLLW)	Core Length Retained for Processing and Analysis (ft)	Actual Sample Depth (-ft MLLW)	Comments
SWM76	**04/30/2010**	1	33°44.022	-118°16.265	35.1	10.0	15.0	50.1	45.1	10.0	45.1	Refusal at 10.0 ft due to compacted clay with shell layer.
SWM77	**05/01/2010**	1	33°40.020	-118°16.287	37.3	12.5	15.0	52.3	49.8	10.5	47.8	Refusal at 12.5 ft.
SWM78	**04/30/2010**	1	33°43.989	-118°16.270	32.0	13.0	15.0	47.0	45.0	13.0	45.0	Refusal at 13.0 ft.
SWM79	**04/30/2010**	1	33°43.984	-118°16.292	39.3	9.0	15.0	54.3	48.3	7.5	46.8	Refusal due to compact layer at approximately - 47 ft MLLW.
SWM80	**05/04/2010**	1	33°43.955	-118°16.278	36.0	1.0	15.0	51.0	37.0	0.0	36.0	No sample collected. Refusal.
		2	33°43.951	-118°16.281	36.1	4.0	15.0	51.1	40.1	2.0	38.1	Refusal at 4.0 ft.
SWM81	**05/03/2010**	1	33°43.952	-118°16.313	38.0	9.5	15.0	53.0	47.5	9.5	47.5	Refusal at 9.5 ft.
SWM82	**05/04/2010**	1	33°43.918	-118°16.270	32.5	1.0	15.0	47.5	33.5	0.0	32.5	No sample collected. Refusal at 1.0 ft.
		2	33°43.921	-118°16.273	33.2	15.0	15.0	48.2	48.2	15.0	48.2	
SWM83	**05/03/2010**	1	33°43.906	-118°16.276	31.8	4.0	15.0	46.8	35.8	0.0	31.8	Refusal due to debris. Moved to another location for reattempt.
		2	33°43.908	-118°16.274	30.8	3.0	15.0	45.8	33.8	3.0	33.8	Refusal at 3.0 ft.
SWM84	**05/03/2010**	1	33°43.906	-118°16.340	46.5	11.5	15.0	61.5	58.0	10.5	57.0	Refusal at 11.5 ft.
SWM85	**05/03/2010**	1	33°43.878	-118°16.278	31.1	9.0	15.0	46.1	40.1	6.0	37.1	Refusal due to debris or rock at 9.0 ft.
	05/05/2010	2	33°43.879	-118°16.277	31.3	5.0	15.0	46.3	36.3	0.0	31.3	1st attempt used. Refusal due to concrete or rocks along wharf face.
SWM86	**05/03/2010**	1	33°43.882	-118°16.304	39.9	15.0	15.0	54.9	54.9	12.0	51.9	
SWM87	**05/03/2010**	1	33°43.850	-118°16.292	38.9	12.5	15.0	53.9	51.4	12.5	51.4	Pictures mislabeled as site "SWM 85." Refusal at 12.5 ft.
SWM88	**05/05/2010**	1	33°43.913	-118°16.263	21.5	1.0	2.0	23.5	22.5	1.0	22.5	Large rocks at 1.0 ft caused refusal, rock slope increases dramatically starting at 6.0 ft under the pier. Large rocks and concrete slabs extend offshore.
SWM89	**05/05/2010**	1	33°44.015	-118°16.243	27.0	1.5	2.0	29.0	28.5	1.5	28.5	Rocks at 1.5 ft below mudline caused refusal. Slope increases dramatically at wharf face (approximately - 27 ft MLLW). Large rocks and concrete slabs extend offshore.
SWM90	**05/05/2010**	1	33°44.052	-118°16.236	28.0	1.3	2.0	30.0	29.3	1.3	29.3	Rocks at 1.3 ft caused refusal. Steep slope up from 28.0 ft starting at wharf face. Large rocks and concrete slabs extend offshore.

3.2 Results of Physical and Chemical Analyses

Results of physical and chemical analyses for project sediment composites are presented in Table 7. All results are expressed in dry weight sediment unless otherwise indicated. Target detection limits were provided in the SAP (WESTON, 2010). The actual detection limits and raw data for the analyses are provided in Appendix B.

3.2.1 Data Gaps

3.2.1.1 Previously Unsampled Areas

Sediment cores from 22 previously unsampled stations (SWM66–SWM87) were collected to provide for improved spatial coverage of the project area. Phase I analysis was conducted on all stations, at depth layers 0–2 ft and 4–6 ft for 19 stations and depth layer 0–2 ft for three stations. At four stations (SWM68, SWM80, SWM84, and SWM87) Phase II and Phase III analyses were not conducted. Phase IIa analysis (2–4 ft) was conducted at 11 stations (SWM67, SWM69, SWM72, SWM74, SWM78–SWM79, SWM81–SWM83, and SWM85–SWM86) and Phase IIb analysis (6–8 ft) was conducted at seven stations (SWM66, SWM70–SWM71, SWM73, and SWM75–SWM77). Phase III analysis was conducted at five stations (SWM66, SWM73, and SWM75–SWM77).

Grain Size and Total Organic Carbon

More than half of the samples collected in previously unsampled areas were composed of greater than 70% sand. These samples were generally from depth intervals deeper than two feet, with the exceptions of stations SWM75, SWM81, SWM83, SWM85, and SWM87, which were composed of large percentages of sand in the 0–2-ft depth interval. Most of the remaining samples were a mixture of sand, silt and clay, with a small percentage (SWM70/0–2 ft, SWM71/0–2ft, SWM73/0–2 ft, and SWM75/10–11 ft) containing predominantly finer-grained silt and clay. None of the samples from previously unsampled stations contained a significant amount of gravel (0% at several depth intervals at several stations to 7.9% at SWM67/0–2 ft). TOC ranged in concentration from below detection limits at SWM84 (4–6 ft) and SWM86 (4–6 ft) to 6.0% at SWM73 (6–8 ft).

Metals

At seven stations (SWM74, SWM80–SWM81, SWM83–SWM84, and SWM86–SWM87) metals concentrations were generally low with at most one metal exceeding an ER-M value at a specific depth interval at a station.

In contrast, six stations (SWM70, SWM72, SWM77–SWM79, and SWM82) had multiple metals exceeding ER-M values in a single depth layer and nine stations (SWM66–SWM69, SWM71, SWM73, SWM75–SWM76, and SWM85) had multiple exceedances at several depth layers. The most common exceedances were for copper, lead, mercury, and zinc. Copper values exceeded the ER-M of 270 mg/kg at 12 stations (SWM66-73, SWM76–SWM77, SWM79, and SWM82), with a maximum concentration of 4,430 mg/kg occurring at SWM73 (6–8 ft). The TTLC value for copper (2,500 mg/kg) was also exceeded at SWM66 (6–8 ft), SWM73 (4–6 ft and 6–8 ft), and SWM86 (8–10 ft). Lead values exceeded the ER-M of 218 mg/kg at 13 stations (SWM66–SWM73, SWM75–SWM78, and SWM85), with a maximum concentration of 1,620 mg/kg at

SWM75 (0–2 ft). Mercury values exceeded the ER-M of 0.71 mg/kg at 19 stations (SWM66–SWM79 and SWM82–SWM86), with a maximum concentration of 74.2 mg/kg at SWM73 (6–8 ft). Zinc values exceeded the ER-M of 410 mg/kg at 13 stations (SWM66–SWM73, SWM75–SWM76, SWM82, and SWM85), with a maximum concentrations of 3,830 mg/kg at SWM76 (8–10 ft).

Organochlorine Pesticides

DDT derivatives and organochlorine pesticide levels at previously unsampled stations were generally below detection limits with a few exceptions, including 2,4'-DDD, 2,4'DDE and aldrin. Dieldrin, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT were measured above ER-M values. Except for SWM78, SWM80, and SWM87 stations, 4,4'-DDD was detected in at least one depth interval of every previously unsampled station. The ER-M of 20 µg/kg was exceeded at six stations, with a maximum concentration of 110 µg/kg at SWM73 (4–6 ft). Detection of 4,4'-DDE occurred in at least one depth interval of every previously unsampled station except SWM80. The ER-M of 27 µg/kg was exceeded at 17 stations, with a maximum concentration of 430 µg/kg at SWM73 (4–6 ft). Detection of 4,4'-DDT occurred at two stations. The ER-M of 7 µg/kg was exceeded only at SWM69 (0–2 ft), with a concentration of 18 µg/kg. Dieldrin was detected at 15 stations with exceedances of the ER-M of 8 µg/kg at six stations and a maximum concentration of 92 µg/kg at SWM67 (0–2 ft). Total DDTs also exceeded its ER-M value (46.1 µg/kg) at 14 stations, with a maximum concentration of 540 µg/kg at SWM73 (4–6 ft).

Organotins

TBT was detected in at least one depth interval at every previously unsampled station except SWM68 and SWM80. TBT exceeded 100 µg/kg at SWM66–SWM67, SWM69–SWM74, and SWM76, all in the 0–2-ft depth interval with the exception of SWM72 (2–4 ft). Station SWM72 also had the highest concentration of TBT measured at a previously unsampled station (1,400 µg/kg). Dibutyltin (DBT) was also detected at all of these stations except SWM68, SWM80, SWM83 and SWM85. DBT concentrations ranged from 7.5–700 µg/kg, with the maximum concentration occurring at SWM72 (2–4 ft). Monobutyltin (MBT) was detected at one depth interval at each of seven stations with a maximum concentration of 17 µg/kg at SWM73 (0–2 ft). Tetrabutyltin (TTBT) was detected at only one depth interval at each of two stations with a maximum concentration of 35 µg/kg occurring at SWM67 (0–2 ft).

Polychlorinated Biphenyls

PCB congeners were detected in at least one depth interval at all previously unsampled stations except SWM80. Total PCB values exceeded the ER-M of 180 µg/kg in at least one depth interval at 15 of these stations with a maximum concentration of 4,871 µg/kg occurring at SWM73 (4–6 ft).

Polycyclic Aromatic Hydrocarbons

PAHs were detected at almost every depth interval of each previously unsampled station, with the exception of SWM79 (4–6 ft), SWM81 (4–6 ft), SWM82 (4–6 ft), and SWM86 (4–6 ft). ER-M exceedances occurred in at least one depth interval at every station except SWM78–SWM80, SWM82–SWM85, and SWM87. ER-M exceedances of acenaphthene (500 µg/kg), acenaphthylene (640 µg/kg), anthracene (1,100 µg/kg), benzo(a)anthracene (1,600 µg/kg), benzo(a)pyrene (1,600 µg/kg), chrysene (2,800 µg/kg), dibenz(a,h)anthracene (260 µg/kg), fluoranthene (5,100 µg/kg), fluorene (540 µg/kg), naphthalene (2,100 µg/kg), phenanthrene

(1,500 µg/kg), and pyrene (2,600 µg/kg) occurred in at least one depth interval of at least one station. The maximum ER-M exceedances for acenaphthene, anthracene, fluoranthene, fluorine and phenanthrene all occurred at SWM75 (10–11 ft). Maximum ER-M exceedances for acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, chrysene and pyrene all occurred at SWM71 (4–6 ft). Maximum ER-M exceedances for dibenz(a,h)anthracene and naphthalene occurred at SWM72 (0–2 ft) and SWM73 (6–8 ft), respectively. Total PAHs exceeded the ER-M value of 44,792 µg/kg at SWM66 (4–6 ft) (71,060 µg/kg), SWM66 (6–8 ft) (97,260 µg/kg), SWM68 (0–2 ft) (121,400 µg/kg), SWM71 (4–6 ft) (327,330 µg/kg), SWM71 (6–7.5 ft) (249,840 µg/kg), SWM72 (0–2 ft) (270,340 µg/kg), SWM73 (4–6 ft) (63,067 µg/kg), SWM73 (6–8 ft) (161,910 µg/kg), SWM75 (10–11 ft) (375,217 µg/kg), and SWM76 (6–8 ft) (67,464 µg/kg).

Chemistry Line-of-Evidence Scores

The final mean chemistry LOE scores for Phase I (0–2 ft) analysis were 4 in all previously unsampled stations except SWM81, which received a score of 3, and SWM80, SWM84, and SWM87, which received a score of 2. Phase I (4–6 ft) results were much more variable, with 11 stations (i.e., SWM69, SWM72, SWM74, SWM78–SWM79, SWM81–SWM82, and SWM84–SWM87) receiving scores of 1 or 2 and eight stations (SWM66, SWM68, SWM70–SWM71, SWM73, and SWM75–SWM77) receiving scores of 3 or 4. Phase IIa (2–4 ft) analysis was conducted on those stations that received scores of 1 or 2 at 4–6 ft and 3 or 4 at 0–2 ft and those stations from which 4–6 ft samples were not collected. Six of these stations (SWM74, SWM78, SWM81–SWM83, and SWM86) received scores of 1 or 2, whereas five stations (SWM67, SWM69, SWM72, SWM79, and SWM85) received scores of 3 or 4. Phase IIb (6–8 ft) analysis was conducted on samples with moderate to high chemistry LOE scores at 4–6 ft. Of those stations, six (SWM66, SWM71, SWM73, and SWM75–SWM77) scored a 4, whereas one (SWM70) scored a 2. Phase III analysis was conducted to analyze deeper sediments (8–10 ft or 10–12 ft) at stations SWM66, SWM73, and SWM75–SWM77. The deepest intervals analyzed at SWM73, SWM75, and SWM77 received scores of 1 or 2, whereas those analyzed at SWM66 and SWM76 received scores of 4.

3.2.1.2 Previously Sampled Areas

Seven stations (SWM20, SWM22, SWM40, SWM49–SWM50, and SWM64–SWM65) were previously sampled. Phase I (target depth layers ranging from 6–8 ft to 12–14 ft) analysis was conducted on all but one station (SWM49). Phase II and Phase III analyses were not conducted at SWM50, SWM64, or SWM65. Phase II analysis was conducted at SWM20 and SWM22 at 8–10-ft and 7–9-ft depth intervals, respectively and Phase III analysis was conducted at SWM20, SWM40, and SWM49.

Grain Size and Total Organic Carbon

Half of the samples collected in previously sampled areas were predominantly (70% or greater) sand. These samples were all collected at depths of 8–10 ft, 10–12 ft, or 12–14 ft. Four of the samples were a mixture of sand, silt, and clay, whereas the two remaining samples were primarily silt and clay. None of the samples contained a significant amount of gravel (less than 3.5%). TOC ranged in concentration from below detection limits at SWM50 (8–10 ft) to 6.8% at SWM20 (6–8 ft).

Metals

At five previously sampled stations (SWM40, SWM49–SWM50, and SWM64–SWM65), metals concentrations were generally low with a maximum of one metal exceeding an ER-M value at a specific depth interval at a station. At SWM40, mercury was the only metal to exceed its ER-M value (0.71 mg/kg) with a concentration of 17.7 mg/kg in the 10–12-ft depth interval. Mercury also exceeded its ER-M value at SWM64 with a concentration of 5.69 mg/kg in the 12–14-ft depth interval.

In contrast, two stations (SWM20 and SWM22) had multiple metals exceeding ER-M values in at least one depth layer. Copper, lead, mercury, and zinc all exceeded ER-M values (270 mg/kg, 218 mg/kg, 0.71 mg/kg, and 410 mg/kg, respectively) at all depth intervals at SWM20 and at the 5–7-ft depth interval at SWM22. Maximum concentrations of copper (3,060 mg/kg), lead (1,280 mg/kg), and zinc (2,950 mg/kg) at previously sampled stations were all measured at SWM20 (6–8 ft). A maximum concentration of mercury (112 mg/kg) was measured at SWM20 (10–12 ft). Copper also exceeded its TTLC (2,500 mg/kg) at the 6–8-ft depth interval of SWM20. Other ER-M exceedances were detected for arsenic (exceeding its ER-M value of 70 mg/kg at SWM20 (6–8 ft) with a concentration of 82.2 mg/kg) and nickel (exceeding its ER-M value of 51.6 mg/kg at SWM20 (10–12 ft) with a concentration of 61.6 mg/kg).

Organochlorine Pesticides

DDT derivatives and organochlorine pesticide levels at previously sampled stations were generally below detection limits with a few exceptions. Detection of 4,4'-DDD and dieldrin were sporadic at these stations and both 4,4'-DDE and 4,4'-DDT were measured above ER-M values. Detection of 4,4'-DDE occurred at three previously sampled stations and exceeded its ER-M value (27 µg/kg) at two of these stations with a maximum concentration of 44 µg/kg at SWM22 (5–7 ft). Detection of 4,4'-DDT occurred at one station (SWM22) where it exceeded its ER-M value of 7 µg/kg at the 5–7-ft depth interval with a concentration of 13 µg/kg. Total DDTs exceeded the ER-M value of 46.1 µg/kg at SWM 20 (4–6 ft) (46.3 µg/kg) and at SWM22/5–7 ft (69 µg/kg).

Organotins

Organotins were below detection limits at every depth interval of each previously sampled station.

Polychlorinated Biphenyls

Most PCB congeners were not detected or were detected at concentrations between the detection limit and method reporting limit (RL) at previously sampled stations with a few exceptions. Several PCB congeners were detected above RLs at SWM20 (6–8 ft) and SWM22 (5–7 ft). Total PCB values at these stations were 639 µg/kg and 811 µg/kg, respectively, which exceeds the ER-M (180 µg/kg).

Polycyclic Aromatic Hydrocarbons

PAHs were detected at every depth interval of each previously sampled station. ER-M exceedances occurred in at least one depth interval at every station except SWM49–SWM50 and SWM65. Exceedances of ER-M values for 2-methylnaphthalene (670 µg/kg), acenaphthene (500 µg/kg), anthracene (1,100 µg/kg), benzo(a)anthracene (1,600 µg/kg), benzo(a)pyrene (1,600 µg/kg), chrysene (2,800 µg/kg), dibenz(a,h)anthracene (260 µg/kg), fluoranthene (5,100 µg/kg),

fluorene (540 µg/kg), phenanthrene (1,500 µg/kg), and pyrene (2,600 µg/kg) occurred in at least one depth interval of at least one previously sampled station. The maximum ER-M exceedances for acenaphthene, fluorine, and phenanthrene all occurred at SWM20 (8–10 ft). The maximum ER-M exceedances for anthracene, benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, and pyrene all occurred at SWM20 (6–8 ft). The maximum ER-M exceedance for 2-methylnaphthalene occurred at SWM22 (5–7 ft). Total PAHs exceeded the ER-M value of 44,792 µg/kg at SWM20 (6–8 ft) (956,000 µg/kg), SWM20 (8–10 ft) (281,020 µg/kg), and SWM22 (5–7 ft) (93,230 µg/kg).

Chemistry Line-of-Evidence Scores

The final mean chemistry LOE scores for Phase I analysis of previously sampled stations ranged from 1 at SWM50 (8–10 ft) and SWM65 (10–11 ft); to 4 at SWM20 (6–8 ft), SWM22 (5–7 ft), SWM40 (10–12 ft), and SWM64 (12–14 ft). No further samples were analyzed at SWM50, SWM64, or SWM65. Phase II analysis was conducted at SWM20 and SWM22, with resulting mean chemistry LOE scores of 3 or 4 at both stations. Phase III analysis was conducted at SWM20, SWM40, and SWM49. Resulting mean chemistry LOE scores were 1 at SWM40 (12–14 ft and 14–15 ft). SWM49 received a score of 4 at the 8–10-ft depth interval and a 2 at the 12–14-ft depth interval. SWM20 (10–12 ft) received a score of 4. The deepest intervals analyzed at SWM40, SWM49, SWM50, and SWM65 received scores of 1 or 2, whereas those analyzed at SWM20, SWM22, and SWM64 received scores of 3 or 4.

Table 7. Summary of Physical Measurements and Chemistry Analytical Results at Berths 240X, Y, and Z Project Area, Port of Los Angeles with a Comparison to Sediment Quality Values

Analyte	Units	ERL	ERM	Phase I	Phase II	Phase III	Phase I	Phase II	Phase III	Phase III	Phase III	Phase III	Phase I	Phase I	Phase I	Phase I	Phase I	Phase II	Phase III	Phase I	Phase II	Phase I	Phase I	Phase I	Phase I	Phase I	Phase II	Phase I	Phase I	Phase I	Phase II	Phase I
				SWM20	SWM20	SWM20	SWM22	SWM22	SWM40	SWM40	SWM40	SWM49	SWM49	SWM50	SWM64	SWM65	SWM66	SWM66	SWM66	SWM66	SWM67	SWM67	SWM68	SWM68	SWM69	SWM69	SWM69	SWM70	SWM70	SWM70	SWM71	SWM71	SWM71	SWM72
				6-8 ft	8-10 ft	10-12	5-7 ft	7-9 ft	10-12 ft	12-14	14-15	8-10	12-14	8-10 ft	12-14 ft	10-11 ft	0-2 ft	4-6 ft	6-8 ft	10-12	0-2 ft	2.3-5 ft	0-2 ft	4-5.3 ft	0-2 ft	2-4 ft	4-5.5 ft	0-2 ft	4-6 ft	6-8 ft	0-2 ft	4-6 ft	6-7.5 ft	0-2 ft
Grain Size																																	
Gravel	%			1.9	1.5	0.8	0.4	0.0	0.1	0.0	0.0	0.0		2.0	3.4	0.0	0.6	0.5	0.5	0.3	7.9	2.0	4.9	1.5	1.2	1.5	4.9	0.7	0.1	0.2	1.0	0.7	3.7	3.2
Sand	%			36.1	8.6	4.2	21.1	56.0	23.4	95.6	96.6	96.7		97.0	70.0	96.1	25.0	45.4	26.4	87.3	46.9	90.0	91.4	95.1	39.7	52.3	91.3	11.8	73.9	88.7	16.1	70.9	67.5	24.2
Silt	%			34.5	38.2	35.6	42.0	31.5	40.9	3.3	2.5	2.5		0.5	14.4	1.9	39.8	31.4	47.5	7.8	24.1	4.3	2.2	2.0	28.8	26.6	1.9	45.4	12.3	6.5	43.7	16.4	16.1	39.9
Clay	%			27.5	51.8	59.4	36.5	12.4	35.5	1.1	0.9	0.9		0.4	12.2	1.9	34.6	22.7	25.6	4.6	21.2	3.7	1.5	1.4	30.3	19.6	1.9	42.1	13.7	4.6	39.2	12.0	12.7	32.8
General Chemistry																																	
Carbon, Total Organic	%			6.8	4.9	5.6	3.6	1.2	2.2	0.13	0.25	0.19	0.13	<0.014	1	0.3	3.2	3.2	3.8	0.71	2.1	0.56	1	0.68	2.3	1.8	0.22	3.8	1.1	0.43	4	3	2.3	4.2
Solids, Total	%			52.5	50.8	49	54.4	69.4	61.1	77.8	76.9	84	83.7	85.3	76.2	77.3	50.5	61	54.3	80.2	55.5	84.3	78.1	81.3	58.9	67.4	82.2	47.7	72.1	78.3	46.9	69.7	70.3	51
Trace Metals																																	
Arsenic	mg/kg	8.2	70	82.2	64.2	29.9	33.3B	8.68	13.6	2.32	2.21	2	1.65	0.63	6.04	2.68	15.3	19.9	52.1	6.18	52.1B	13.9	41.9	30.7	20.4B	15.2	2.78B	38.3B	6.69B	3.8	20.9	22.6	31.2	32.6
Cadmium	mg/kg	1.2	9.6	3.44	2.53B	2.04	1.97	0.683B	1.08	0.132	0.123J	0.174	0.112J	0.0362J	0.497	0.125J	0.951	1.56	3.06B	0.582	3.16	1.02B	1.23	2.07	0.879	1.02B	0.109J	2.22	0.531	0.305B	0.961	1.8	1.28B	6.77
Chromium	mg/kg	81	370	181	66.6	57.1B	68.4	27.2	33.4	7.81B	7.7B	15.7B	8.99B	4.56	17.7	9.07	70.5	105	251	43.2B	116	80.8	110	185	94.8	39.1	7.23	127	21.1	14.9	102	191	118	91.6
Copper	mg/kg	34	270	3060	1400	1280	827	79.5	194	10.2	5.22	29.9	9.86	2.27	105	6.49	272	1170	3590	510	1520	1300	1820	1790	535	287	8.5	783	75.5	26.1	502	2130	1410	728
Lead	mg/kg	46.7	218	1280	516	420	326	44.1	117	7.14	8.05	65.1	23.4	1.02	160	9.6	174	384	802	232	518	239	1260	1500	279	470	7.24	355	86.2	44.9	232	651	870	1430
Mercury	mg/kg	0.15	0.71	96.2	92.2	112	43.5	3.32	17.7	0.219	0.0619	0.282	0.138	<0.0152	5.69	0.0287	1.94	23.4	44.5	4.84	4.91	5.1	32.1	22.7	10.8	11.2	0.211	13.5	4.67	1.42	5.62	16	16.1	18.1
Nickel	mg/kg	20.9	51.6	38.4	50.7	61.6	46.8	19.4	27.1	5.1	5.48	6.64	4.61	3.92	14.2	6.02	40.5	30.7	40.1	10.2	36.8	12.5	16.7	11.5	31.4	23.1	4.78	41.7	15.2	9.42	37.6	19.8	24.9	42.8
Selenium	mg/kg			0.857	1.88	1.55	1.98	0.536	0.981	0.0934J	<0.0449	<0.0411	<0.0412	<0.0404	0.458	0.0875J	1.19	0.949	1.67	0.127	0.517	<0.0409	0.312	<0.0424	0.886	0.642	0.175	1.95	0.564	0.179	1.41	<0.0495	0.602	1.19
Silver	mg/kg	1	3.7	1.8	1.2	0.891	0.917	0.193	0.366	0.0288J	0.0242J	0.0454J	0.0213J	<0.00414	0.14	0.0236J	0.671	0.712	1.39	0.155	0.684	0.169	0.325	0.0624J	0.605	0.397	0.0361J	1.24	0.178	0.0744J	0.82	0.554	0.575	1.88
Zinc	mg/kg	150	410	2950	1210	829B	728B	211	306	24B	22.1B	121B	70B	13.7	132	31.7	331	767	2250	462B	2650B	893	1170	1620	504B	451	20.1B	692B	137B	130	516	3390	1070	1700
Polynuclear Aromatic Hydrocarbons																																	
1,6,7-Trimethylnaphthalene	ug/kg			3000J	8400	460	590J	53J	86J	<2.1	<2.2	<2.0	<2.0	<1.9	150	<2.1	<16	120J	110J	13	23J	<9.8	410J	<20	<14	<12	<2.0	<35	5.6J	2.9J	<35	390J	<120	290J
1-Methylnaphthalene	ug/kg			<790	3800	180	980	48J	<34	<2.7	<2.7	<2.5	<2.5	<2.4	140	<2.7	<21	<68	54J	7.9J	53J	47J	<130	<26	22J	<15	<2.5	<43	12J	6.2J	<44	340J	<150	520
1-Methylphenanthrene	ug/kg			8800	<220	530	1000	<16	<36	<2.8	<2.9	<2.6	<2.6	<2.6	280	<2.8	<22	<72	<41	56	<20	<13	<140	<27	<19	<16	<2.7	<46	<3.1	<2.8	<47	<160	<160	2100
2,6-Dimethylnaphthalene	ug/kg			1400J	4900	260	1300	90	72J	<2.2	<2.2	2.5J	<2.0	<2.0	160	<2.2	94J	230J	330	18	120	39J	1100	<21	79J	53J	<2.1	210J	27	10J	110J	670J	330J	480
2-Methylnaphthalene	ug/kg	70	670	<700	2700	91	2300	93	36J	<2.4	<2.4	3J	<2.2	<2.2	120J	<2.4	21J	<60	76J	9.1J	56J	140	<120	<23	35J	28J	<2.2	<39	20	9.9J	44J	490J	200J	550
Acenaphthene	ug/kg	16	500	7200	11000	890	6500	540	460	<1.9	<2.0	9.4J	2.9J	<1.8	730	<2.0	41J	620	360	82	270	35J	<97	<19	36J	25J	<1.8	77J	26	17	<32	780	310J	1300
Acenaphthylene	ug/kg	44	640	2600J	790J	110	200J	46J	81J	4J	3.4J	5.5J	<1.7	<1.7	90J	<1.9	300	310J	570	49	300	70	480J	140	370	150	3.2J	700	58	19	430	1600	1100	1100
Anthracene	ug/kg	85.3	1100	30000	6500	1400	2900	390	1300	9.6J	3.1J	24	8.6J	<1.5	1100	<1.7	480	2200	2200	230	770	120	510J	150	590	260	4.6J	1200	150	62	730	9000	5500	4000
Benzo (a) Anthracene	ug/kg	261	1600	79000	13000	1700	3100	440	1300	35	17	51	18	3.3J	1700	11J	580	5600	8700	690	2300	390	2300	1100	760	310	8.1J	1200	130	79	1300	28000	23000	15000
Benzo (a) Pyrene	ug/kg	430	1600	56000	7500	1300	1300	360	820	36	35	78	32	7.5J	1400	14	2300	5800	8900	640	4800	1000	7300	2100	3100	1500	31	6700	510	210	5900	30000	26000	28000
Benzo (b) Fluoranthene	ug/kg			63000	7400	1300	920	340	990	29	25	75	33	5.5J	1300	12J	2500	5700	7800	610	5800	930	7800	2200	3400	1500	29	6900	650	200	7100	32000	24000	28000
Benzo (e) Pyrene	ug/kg			40000	6000	950	960	250	620	24	22	47	21	4.7J	880	7.4J	1300	3800	6200	470	3600	620	34000	1700	1700	510	15	3900	330	100	3500	20000	18000	18000
Benzo (g,h,i) Perylene	ug/kg			28000	3400	550	460J	190	450	21	45	34	14	3.8J	710	12J	1100	2700	4300	340	2100	510	5400	1600	1400	730	17	2700	250	100	3200	15000	11000	19000
Benzo (k) Fluoranthene	ug/kg			40000	6800	1200	1400	290	560	34	24	71	33	6.3J	1200	13J	2300	4600	7200	510	5700	740	7000	1800	3100	1200	30	5600	470	190	4600	24000	18000	22000
Biphenyl	ug/kg			<600	1800	63	250J	33J	<26	<2.0	<2.1	<1.9	<1.9	<1.9	81J	<2.0	<16	<52	40J	4J	31J	22J	220J	<19	<13	15J	<1.9	<33	9.5J	5.4J	<34	<110	<110	<62
Chrysene	ug/kg	384	2800	120000	19000	2300	2700	520	1500	50	19	53	19	5.7J	2000	7.3J	1100	7100	10000	850	3100	450	3000	1100	1300	430	9.4J	2300	180	88	2400	41000	31000	21000
Dibenz (a,h) Anthracene	ug/kg	63.4	260	8100	830J	200	<97	52J	53J	<1.4	<1.4	<1.3	<1.3	<1.2	150	<1.4	350	960	1400	98	720	170	1100	430	500	220	5.6J	850	84	29	1100	4400	4300	4700
Fluoranthene	ug/kg	600	5100	240000	48000	6300	14000	1200	3900	26	21	100	33	6J	4700	8.1J	610	9800	13000	1200	3100	510	2100	770	720	400	7.4J	1300	130	98	1000	40000	21000	30000
Fluorene	ug/kg	19	540	7900	17000	1000	9400	520	320	<1.8	<1.8	11J	3J	<1.6	870	<1.8	64J	710	600	98	280	50J	<89	45J	59J	49J	<1.7	<29	37	16	100J	2100	1100	1500
Indeno (1,2,3-c,d) Pyrene	ug/kg			22000	3100	570	370J	200	360	21	35	36	13	3.3J	600	9.6J	980	2500	5000	350	2000	590	4200	1300	1400	800	14	2600	220	110	2900	13000	12000	16000
Naphthalene	ug/kg	160	2100	<630	3600	230	1300	100	110J	<2.1	<2.1	10J	3.5J	<1.9	170	<2.1	40J	110J	220	34	120	150	<110	<20	51J	82	<2.0	81J	70	42	67J	860	1000	1200
Perylene	ug/kg			13000	2500	610	<180	<14	350	<2.5	7.3J	17	8.1J	<2.3	400	<2.5	530	1400	2200	160	1100	180	13000	460	490	<14	2.8J	770	100	<2.5	870	7600	6100	5600
Phenanthrene	ug/kg	240	1500	36000	66000	2400	32000	1600	2300	8.9J	7.9J	85	24	<2.5	3700	3.4J	300	4800	3000	490	1900	300	480J	210	400	290	3.7J	680	120	47	510	9100	3900	17000
Pyrene	ug/kg	665	2600	150000	37000	5400	9300	1600	5400	61	31	160	130	7.9J	4300	10J	610	12000	15000	1400	4600	720	31000	7700	890	550	12J	2000	710	190	1100	47000	42000	33000
Total Detectable PAHs	ug/kg	4022	44792	956000	281020	29994	93230	8955	21068	359.5	295.7	872.4	396.1	54	26931	107.8	15600	71060	97260	8409	42843	7783	121400	22805	20402	9102	192.8	39768	4299.1	1631.4	36961	327330	249840	270340
Chlorinated Pesticides																																	
2,4'-DDD	ug/kg			<0.38	<0.40	<0.41	<0.37	<0.29	<0.33	<0.26	<0.26	<0.24	<0.24	<0.24	<0.26	<0.26	<0.40	<0.33	<0.37	<0.25	<0.36	5.4	<0.26	<0.25	<0.34	1.9	<0.24	<0.42	<0.28	<0.26	2.7	12	3.3	<0.39
2,4'-DDE	ug/kg			<0.34	<0.35	<0.36	<0.33	0.69J	<0.29	<0.23	<0.23	<0.21	<0.21	<0.21	6.1	<0.23	95	<0.29	60	<0.22	59	14	5.9	0.95J	<0.30	2.7	<0.22	53	5.1	0.49J	12	<0.26	<0.25	<0.35
2,4'-DDT	ug/kg			<0.27	<0.28	<0.29	<0.26	<0.20	<0.23	<0.18	<0.18	<0.17	<0.17	<0.16	<0.18	<0.18	<0.28	<0.23	<0.26	<0.17	<0.25	<0.17	<0.18	<0.17	<0.24	<0.21	<0.17	<0.29	<0.19	<0.18	<0.30	<0.20	<0.20	<0.27
4,4'-DDD	ug/kg	2	20	6.3	<0.51	<0.53	12	<0.37	<0.42	<0.33	<0.34	<0.31	<0.31	<0.30	<0.34	<0.33	5.8	11	31	<0.32	37	27	6.5	3	65	4.5	0.55J	34	2.1	<0.33	12	44	5.6	20
4,4'-DDE	ug/kg	2.2	27	40	<0.59	<0.61	44	1.4J	1.7	<0.39	<0.39	<0.36	<0.36	<0.35	6.8	<0.39	39	140	360	<0.37	230	39	3.8	2.2	180	14	1.2J	250	15	1.4	66	190	20	99
4,4'-DDT	ug/kg	1	7	<0.62	<0.65	<0.67	13	<0.47	<0.54	<0.42	<0.43	<0.39	<0.39	<0.38	<0.43	<0.42	<0.65	<0.54	<0.60	<0.41	<0.59	<0.39	<0.42	<0.40	18	<0.49	<0.40	<0.69	<0.45	<0.42	<0.70	<0.47	<0.47	<0.64
Aldrin	ug/kg			<0.59	<0.61	<0.63	<0.57	<0.45	<0.51	<0.40	<0.40	<0.37	<0.37	<0.36	<0.41	<0.40	<0.61	<0.51	<0.57	<0.39	<0.56	<0.37	<0.40	<0.38	<0.52	<0.46	<0.38	<0.65	<0.43	<0.39	<0.66	<0.44	2.5	<0.61
Alpha Chlordane	ug/kg			<0.49	<0.51	<0.53	<0.47	<0.37	<0.42	<0.33	<0.34	<0.31	<0.31	<0.30	<0.34	<0.33	<0.51	<0.42	<0.48	<0.32	<0.46	<0.31	<0.33	<0.32	<0.44	<0.38	<0.31	<0.54	<0.36	<0.33	<0.55	<0.37	<0.37	<0.51
Alpha-BHC	ug/kg			<0.56	<0.58	<0.60	<0.54	<0.42	<0.48	<0.38	<0.38	<0.35	<0.35	<0.34	<0.39	<0.38	<0.58	<0.48	<0.54	<0.37	<0.53	<0.35	<0.38	<0.36	<0.50	<0.44	<0.36	<0.62	<0.41	<0.38	<0.63	<0.42	<0.42	<0.58
Beta-BHC	ug/kg			<0.49	<0.50	<0.52	<0.47	<0.37	<0.42	<0.33	<0.33	<0.30	<0.30	<0.30	<0.33	<0.33	<0.50	<0.42	<0.47	<0.32	<0.46	<0.30	<0.33	<0.31	<0.43	<0.38	<0.31	<0.53	<0.35	<0.33	<0.54	<0.37	<0.36	<0.50
Chlordane	ug/kg			<7.6	<7.9	<8.2	<7.4	<5.8	<6.6	<5.1	<5.2	<4.8	<4.8	<4.7	<5.3	<5.2	<7.9	<6.6	<7.4	<5.0	<7.2	<4.8	<5.1	<4.9	<6.8	<5.9	<4.9	<8.4	<5.6	<5.1	<8.5	<5.7	<5.7	<7.9
Cis-nonachlor	ug/kg			<1.0	<1.1	<1.1	<0.99	<0.78	<0.88	<0.69	<0.70	<0.64	<0.64	<0.63	<0.71	<0.70	<1.1	<0.88	<0.99	<0.67	<0.97	<0.64	<0.69	<0.66	<0.91	<0.80	<0.65	<1.1	<0.75	<0.69	<1.1	<0.77	<0.77	<1.1
Delta-BHC	ug/kg			<0.61	<0.63	<0.65	<0.58	<0.46	<0.52	<0.41	<0.41	<0.38	<0.38	<0.37	<0.42	<0.41	<0.63	<0.52	<0.59	<0.40	<0.57	<0.38	<0.41	<0.39	<0.54	<0.47	<0.39	<0.67	<0.44	<0.41	<0.68	<0.46	<0.45	<0.62
Dieldrin	ug/kg	0.02	8	<0.43	<0.45	<0.46	3.5	<0.33	<0.37	<0.29	<0.29	<0.27	<0.27	<0.27	<0.30	<0.29	<0.45	<0.37	41	<0.28	92	30	<0.29	<0.28	17	<0.34	<0.28	11	0.52J	<0.29	<0.48	<0.33	3.2	<0.44
Endosulfan I	ug/kg			<0.68	<0.70	<0.73	<0.65	<0.51	<0.58	<0.46	<0.46	<0.42	<0.43	<0.42	<0.47	<0.46	<0.71	<0.58	<0.66	<0.44	<0.64	<0.42	<0.46	<0.44	<0.60	<0.53	<0.43	<0.75	<0.49	<0.45	<0.76	<0.51	<0.51	<0.70
Endosulfan II	ug/kg			<0.33	<0.35	<0.36	<0.32	<0.25	<0.29	<0.23	<0.23	<0.21	<0.21	<0.21	<0.23	<0.23	<0.35	<0.29	<0.32	<0.22	<0.32	<0.21	<0.22	<0.22	<0.30	<0.26	<0.21	<0.37	<0.24	<0.22	<0.37	<0.25	<0.25	<0.34
Endosulfan Sulfate	ug/kg			<0.50	<0.52	<0.54	<0.48	<0.38	<0.43	<0.34	<0.34	<0.31	<0.31	<0.31	<0.35	<0.34	<0.52	<0.43	<0.48	<0.33	<0.47	<0.31	<0.34	<0.32	<0.45	<0.39	<0.32	<0.55	<0.36	<0.34	<0.56	<0.38	<0.37	<0.52
Endrin	ug/kg			<0.38	<0.40	<0.41	<0.37	<0.29	<0.33	<0.26	<0.26	<0.24	<0.24	<0.24	<0.26	<0.26	<0.40	<0.33	<0.37	<0.25	<0.36	<0.24	<0.26	<0.25	<0.34	<0.30	<0.25	<0.42	<0.28	<0.26	<0.43	<0.29	<0.29	<0.40
Endrin Aldehyde	ug/kg			<0.37	<0.38	<0.40	<0.36	<0.28	<0.32	<0.25	<0.25	<0.23	<0.23	<0.23	<0.26	<0.25	<0.39	<0.32	<0.36	<0.24	<0.35	<0.23	<0.25	<0.24	<0.33	<0.29	<0.24	<0.41	<0.27	<0.25	<0.42	<0.28	<0.28	<0.38
Endrin Ketone	ug/kg			<0.57	<0.59	<0.61	<0.55	<0.43	<0.49	<0.39	<0.39	<0.36	<0.36	<0.35	<0.39	<0.39	<0.59	<0.49	<0.55	<0.37	<0.54	<0.36	<0.38	<0.37	<0.51	<0.45	<0.37	<0.63	<0.42	<0.38	<0.64	<0.43	<0.43	<0.59
Gamma Chlordane	ug/kg			<0.49	<0.51	<0.53	<0.47	<0.37	<0.42	<0.33	<0.34	<0.31	<0.31	<0.30	<0.34	<0.33	<0.51	<0.42	<0.48	<0.32	<0.46	<0.31	<0.33	<0.32	<0.44	<0.38	<0.31	<0.54	<0.36	<0.33	<0.55	<0.37	<0.37	<0.51
Gamma-BHC	ug/kg			<0.44	<0.45	<0.47	<0.42	<0.33	<0.37	<0.29	<0.30	<0.27	<0.27	<0.27	<0.30	<0.30	<0.45	<0.37	<0.42	<0.28	<0.41	<0.27	<0.29	<0.28	<0.39	<0.34	<0.28	<0.48	<0.32	<0.29	<0.49	<0.33	<0.33	<0.45
Heptachlor	ug/kg			<0.42	<0.44	<0.46	<0.41	<0.32	<0.36	<0.29	<0.29	<0.27	<0.27	<0.26	<0.29	<0.29	<0.44	<0.37	<0.41	<0.28	<0.40	<0.26	<0.29	<0.27	<0.38	<0.33	<0.27	<0.47	<0.31	<0.28	<0.48	<0.32	<0.32	<0.44
Heptachlor Epoxide	ug/kg			<0.35	<0.36	<0.37	<0.34	<0.26	<0.30	<0.24	<0.24	<0.22	<0.22	<0.22	<0.24	<0.24	<0.36	<0.30	<0.34	<0.23	<0.33	<0.22	<0.24	<0.23	<0.31	<0.27	<0.22	<0.39	<0.25	<0.23	<0.39	<0.26	<0.26	<0.36
Methoxychlor	ug/kg			<0.32	<0.33	<0.34	<0.31	<0.24	<0.27	<0.22	<0.22	<0.20	<0.20	<0.20	<0.22	<0.22	<0.33	<0.27	<0.31	<0.21	<0.30	<0.20	<0.21	<0.21	<0.28	<0.25	<0.20	<0.35	<0.23	<0.21	<0.36	<0.24	<0.24	<0.33
Total Detectable Chlordane (a,g)	ug/kg	0.5	6	<0.49	<0.51	<0.53	<0.47	<0.37	<0.42	<0.33	<0.34	<0.31	<0.31	<0.3	<0.34	<0.33	<0.51	<0.42	<0.48	<0.32	<0.46	<0.31	<0.33	<0.32	<0.44	<0.38	<0.31	<0.54	<0.36	<0.33	<0.55	<0.37	<0.37	<0.51
Total Detectable DDTs	ug/kg	1.58	46.1	46.3	<0.28	<0.29	69	2.09	1.7	<0.18	<0.18	<0.17	<0.17	<0.16	12.9	<0.18	139.8	151	451	<0.17	326	85.4	16.2	6.15	263	23.1	1.75	337	22.2	1.89	92.7	246	28.9	119
Toxaphene	ug/kg			<16	<17	<17	<16	<12	<14	<11	<11	<10	<10	<9.9	<11	<11	<17	<14	<16	<11	<15	<10	<11	<10	<14	<13	<10	<18	<12	<11	<18	<12	<12	<17
Trans-nonachlor	ug/kg			8.6	<1.1	<1.1	<1.0	<0.79	<0.90	<0.71	<0.71	<0.65	<0.66	<0.64	<0.72	<0.71	<1.1	<0.90	<1.0	<0.68	<0.99	<0.65	<0.70	<0.68	<0.93	<0.81	<0.67	<1.2	<0.76	<0.70	<1.2	<0.79	<0.78	<1.1

Table 7. Summary of Physical Measurements and Chemistry Analytical Results at Berths 240X, Y, and Z Project Area, Port of Los Angeles with a Comparison to Sediment Quality Values (continued)

Analyte	Units	ERL	ERM	Phase I SWM 20 6-8 ft	Phase II SWM20 8-10 ft	Phase III SWM20 10-12	Phase I SWM 22 5-7 ft	Phase II SWM22 7-9 ft	Phase I SWM 40 10-12 ft	Phase III SWM40 12-14	Phase III SWM40 14-15	Phase III SWM49 8-10	Phase III SWM49 12-14	Phase I SWM 50 8-10 ft	Phase I SWM 64 12-14 ft	Phase I SWM 65 10-11 ft	Phase I SWM 66 0-2 ft	Phase I SWM 66 4-6 ft	Phase II SWM66 6-8 ft	Phase III SWM66 10-12	Phase I SWM 67 0-2 ft	Phase II SWM67 2.3-5 ft	Phase I SWM 68 0-2 ft	Phase I SWM 68 4-5.3 ft	Phase I SWM 69 0-2 ft	Phase II SWM69 2-4 ft	Phase I SWM 69 4-5.5 ft	Phase I SWM 70 0-2 ft	Phase I SWM 70 4-6 ft	Phase II SWM70 6-8 ft	Phase I SWM 71 0-2 ft	Phase I SWM 71 4-6 ft	Phase II SWM71 6-7.5 ft	Phase I SWM 72 0-2 ft
PCB Congeners																																		
PCB008	ug/kg			<17	<3.5	<3.7	<17	<2.6	<2.9	<2.3	<2.3	<2.1	<2.1	<2.1	<2.4	<2.3	<3.6	95	10	4.1J	13	16	12	<11	4.1J	<2.7	<2.2	5.6J	<2.5	<2.3	<3.8	<13	4.9J	<7.0
PCB018	ug/kg			<17	<3.4	<3.6	<16	<2.5	<2.9	<2.2	<2.3	<2.1	<2.1	<2.0	<2.3	<2.3	9.1J	340	<3.2	13	32	63	22	34	24	15	<2.1	26	5.4J	<2.2	13	20J	12	19J
PCB028	ug/kg			<17	<3.4	<3.5	<16	<2.5	<2.8	<2.2	<2.3	<2.1	<2.1	<2.0	<2.3	<2.2	6.3J	170	<3.2	6.2J	46	<2.1	10	36	14	25	<2.1	15	9.1	<2.2	11	<12	<2.5	13J
PCB037	ug/kg			23J	<3.5	<3.6	35J	<2.6	<2.9	<2.3	<2.3	<2.1	<2.1	<2.1	<2.3	<2.3	<3.5	41J	<3.3	3.6J	11	9.6	35	28J	10	19	<2.2	18	6J	<2.3	5.7J	<13	22	<7.0
PCB044	ug/kg			24J	<3.5	<3.6	53	5.1J	<2.9	<2.3	<2.3	3J	2.5J	<2.1	<2.3	<2.3	11	130	77	25	40	48	21	56	32	15	<2.1	39	45	2.8J	20	57	21	33
PCB049	ug/kg			25J	<3.4	<3.5	28J	18	19	<2.2	<2.3	4.8J	6.9	<2.0	<2.3	<2.2	6.1J	100	99	32	26	37	14	36	35	73	<2.1	29	24	11	13	37	50	30
PCB052	ug/kg			83	<4.0	<4.2	100	4.3J	5.2J	<2.6	<2.6	6.6	6.7	<2.4	7.2	<2.6	20	200	130	52	58	75	26	58	51	11	<2.5	87	50	<2.6	38	120	27	81
PCB066	ug/kg			<17	<3.4	<3.5	29J	<2.5	<2.8	<2.2	<2.3	<2.1	3.4J	<2.0	<2.3	<2.2	10	74J	62	12	32	34	19	58	27	5J	<2.1	32	41	<2.2	18	38	23	24
PCB070	ug/kg			32J	<3.7	<3.8	35J	<2.7	<3.0	<2.4	<2.4	3J	2.9J	<2.2	<2.4	<2.4	12	93	98	18	48	52	22	64	34	8.1	<2.3	42	20	<2.4	20	82	22	26
PCB074	ug/kg			<17	<3.5	<3.6	25J	<2.5	<2.9	<2.3	<2.3	<2.1	<2.1	<2.1	<2.3	<2.3	4.4J	48J	36	6.1J	16	20	8.8	29J	13	3.8J	<2.2	16	19	<2.3	8J	24J	8.4	11J
PCB077	ug/kg			<17	<3.4	<3.6	<16	<2.5	<2.9	<2.2	<2.3	<2.1	<2.1	<2.0	<2.3	<2.3	<3.5	<29	<3.2	<2.2	7.4J	11	<2.2	<11	9.1	<2.6	<2.1	8.8J	8.2	<2.2	5J	17J	3.1J	<6.8
PCB081	ug/kg			<17	<3.5	<3.6	<16	<2.6	<2.9	<2.3	<2.3	<2.1	<2.1	<2.1	<2.3	<2.3	<3.5	<29	<3.3	<2.2	<3.2	<2.1	<2.3	<11	<3.0	<2.6	<2.2	<3.7	<2.5	<2.3	<3.8	<13	<2.5	<7.0
PCB087	ug/kg			<17	<3.5	<3.6	75	<2.6	31	<2.3	<2.3	<2.1	3.5J	<2.1	<2.3	<2.3	18	94	79	21	68	45	12	<11	82	9.9	<2.2	97	35	<2.3	40	100	13	87
PCB099	ug/kg			20J	<3.5	<3.6	19J	<2.5	<2.9	<2.3	<2.3	3.3J	2.7J	<2.1	<2.3	<2.3	8.9J	48J	79	19	32	30	8	16J	26	4.4J	<2.1	26	12	<2.3	16	69	13	19J
PCB101	ug/kg			43J	<3.7	<3.8	57	<2.7	<3.0	<2.4	<2.4	9.9	8.9	<2.2	2.9J	<2.4	27	150	240	57	110	150	19	30J	87	8.1	<2.3	90	30	<2.4	51	260	38	58
PCB105	ug/kg			38J	<3.8	<3.9	35J	<2.8	<3.2	<2.5	<2.5	3.8J	2.9J	<2.3	<2.5	<2.5	10	56J	67	16	36	34	7.4	12J	39	<2.9	<2.3	38	22	<2.5	20	65	20	40
PCB110	ug/kg			55	<3.3	<3.4	57	<2.4	5J	<2.1	<2.2	8.6	8.1	<1.9	3.6J	<2.1	26	140	180	55	94	110	18	29J	77	15	<2.0	74	32	<2.1	47	210	31	53
PCB114	ug/kg			<16	<3.3	<3.4	<16	5.3J	<2.8	<2.2	<2.2	<2.0	<2.0	<2.0	<2.2	<2.2	<3.3	<28	<3.1	<2.1	<3.0	<2.0	<2.2	<10	<2.9	<2.5	<2.1	<3.5	<2.3	<2.2	<3.6	<12	<2.4	<6.6
PCB118	ug/kg			39J	<3.5	<3.7	62	<2.6	<2.9	<2.3	<2.3	7.1	6.3	<2.1	<2.4	<2.3	22	120	140	39	72	83	15	23J	63	12	<2.2	55	26	<2.3	43	170	30	33
PCB119	ug/kg			23J	<3.4	<3.5	<16	<2.5	<2.8	<2.2	<2.2	<2.1	<2.1	<2.0	<2.3	<2.2	<3.4	<28	<3.2	<2.1	<3.1	2.6J	<2.2	<11	<2.9	<2.6	<2.1	<3.6	<2.4	<2.2	<3.7	<12	<2.5	<6.8
PCB123	ug/kg			<16	<3.3	<3.4	<15	<2.4	<2.7	<2.1	<2.2	<2.0	6.2	<2.0	<2.2	<2.2	<3.3	<27	22	4.6J	5.4J	<2.0	<2.1	<10	4.8J	<2.5	<2.0	6.3J	<2.3	<2.1	<3.6	<12	7.9	<6.5
PCB126	ug/kg			<16	<3.2	<3.3	<15	<2.4	<2.7	<2.1	<2.1	<1.9	<2.0	<1.9	<2.1	<2.1	3.3J	<27	<3.0	<2.0	<2.9	<1.9	<2.1	<10	10	<2.4	<2.0	9.5J	<2.3	<2.1	7.1J	<12	3J	13J
PCB128	ug/kg			<16	<3.2	<3.4	<15	<2.4	<2.7	<2.1	<2.1	2.3J	<2.0	<1.9	<2.2	<2.1	6J	<27	43	10	20	29	<2.1	<10	15	<2.4	<2.0	18	<2.3	<2.1	8.1J	46	6J	<6.5
PCB138/158	ug/kg			96	<6.9	<7.2	62	5.9J	<5.7	<4.5	<4.6	7.8	6.5	<4.1	<4.6	<4.5	32	160	320	55	120	230	13	<22	110	23	<4.3	90	14	<4.5	63	380	27	70
PCB149	ug/kg			31J	<3.3	<3.5	25J	<2.4	<2.8	<2.2	<2.2	4.7J	3.9J	<2.0	<2.2	<2.2	18	83	250	36	73	160	6.7	<10	68	12	<2.1	49	8.6	<2.2	37	260	19	39
PCB151	ug/kg			20J	<3.3	<3.5	31J	5.8J	<2.8	<2.2	<2.2	<2.0	<2.0	<2.0	<2.2	<2.2	7.3J	41J	80	8.8	23	51	2.7J	<10	30	4J	<2.1	23	10	<2.2	15	79	5.3J	26
PCB153	ug/kg			39J	<3.3	<3.4	42J	<2.4	<2.7	<2.1	<2.2	6.8	5.8J	<2.0	<2.2	<2.2	27	130	350	52	110	240	12	<10	100	12	<2.0	73	7.2	<2.1	58	390	24	51
PCB156	ug/kg			<18	<3.8	<3.9	<18	<2.7	<3.1	<2.5	<2.5	<2.3	<2.3	<2.2	<2.5	<2.5	<3.8	<31	42	6.5	13	22	2.7J	<12	15	4.2J	<2.3	6.4J	<2.6	<2.4	9.3J	32J	<2.7	<7.5
PCB157	ug/kg			31J	<3.5	<3.7	21J	9.4	<2.9	<2.3	<2.3	<2.1	<2.2	<2.1	<2.4	<2.3	3.8J	<30	48	5.3J	7.9J	9.3	3.2J	<11	16	14	<2.2	14	7.5	<2.3	7.1J	<13	19	20
PCB167	ug/kg			<16	<3.4	<3.5	<16	<2.5	<2.8	<2.2	<2.2	<2.1	<2.1	<2.0	<2.3	<2.2	<3.4	<28	32	<2.2	3.9J	9.7	<2.2	<11	<2.9	<2.6	<2.1	<3.6	<2.4	<2.2	<3.7	<12	<2.5	<6.8
PCB168	ug/kg			<15	<3.1	<3.2	<15	<2.3	<2.6	<2.0	<2.1	<1.9	5.2J	<1.9	<2.1	<2.1	<3.1	<26	<2.9	<2.0	<2.9	<1.9	2.2J	<9.8	<2.7	<2.4	<1.9	<3.3	<2.2	<2.0	<3.4	<11	<2.3	<6.2
PCB169	ug/kg			<15	<3.1	<3.2	<14	<2.2	<2.5	<2.0	<2.0	<1.8	<1.9	<1.8	<2.0	<2.0	<3.1	<25	10	<1.9	<2.8	5.5J	<2.0	<9.5	<2.6	<2.3	<1.9	<3.3	<2.2	<2.0	<3.3	<11	2.4J	<6.1
PCB170	ug/kg			<14	<2.9	<3.0	<13	<2.1	<2.4	<1.9	<1.9	<1.7	<1.7	<1.7	<1.9	<1.9	8.5J	33J	120	9.3	27	83	2.6J	<9.0	25	<2.2	<1.8	16	<2.0	<1.9	13	130	5.4J	18J
PCB177	ug/kg			<16	<3.4	<3.5	<16	<2.5	<2.8	<2.2	<2.2	<2.1	<2.1	<2.0	<2.3	<2.2	<3.4	<28	36	3.8J	9.5	32	<2.2	<11	10	<2.6	<2.1	5.6J	<2.4	<2.2	5.9J	50	<2.5	<6.8
PCB180	ug/kg			17J	<3.4	<3.6	20J	<2.5	<2.9	<2.2	<2.3	<2.1	<2.1	<2.0	<2.3	<2.3	11	48J	190	15	42	120	3.1J	<11	43	<2.6	<2.1	26	5J	<2.2	25	200	9.4	24
PCB183	ug/kg			<16	<3.3	<3.5	<16	<2.4	<2.8	<2.2	<2.2	<2.0	<2.0	<2.0	<2.2	<2.2	<3.4	<28	45	4.1J	10	32	<2.2	<10	10	<2.5	<2.1	5.9J	<2.4	<2.2	5.9J	48	<2.4	<6.7
PCB184	ug/kg			<16	<3.3	<3.5	<16	<2.4	<2.8	<2.2	<2.2	<2.0	<2.0	<2.0	<2.2	<2.2	<3.4	<28	<3.1	<2.1	<3.1	<2.0	<2.2	<10	<2.9	<2.5	<2.1	<3.6	<2.4	<2.2	<3.6	<12	<2.4	<6.7
PCB187	ug/kg			<16	<3.4	<3.5	<16	<2.5	<2.8	<2.2	<2.2	<2.1	<2.1	<2.0	<2.3	<2.2	6J	28J	96	7.5	23	61	<2.2	<11	21	2.7J	<2.1	13	<2.4	<2.2	13	91	4.8J	12J
PCB189	ug/kg			<16	<3.3	<3.4	<15	<2.4	<2.7	<2.1	<2.2	<2.0	<2.0	<2.0	<2.2	<2.2	<3.3	<27	<3.1	<2.1	<3.0	3.7J	<2.1	<10	<2.8	<2.5	<2.0	<3.5	<2.3	<2.1	<3.6	<12	<2.4	<6.5
PCB194	ug/kg			<13	<2.7	<2.8	<13	<2.0	<2.2	<1.8	<1.8	<1.6	<1.6	<1.6	<1.8	<1.8	3.5J	<22	22	2.4J	<2.5	19	<1.7	<8.4	10	<2.0	<1.7	<2.9	<1.9	<1.7	4.7J	34J	<1.9	<5.4
PCB195	ug/kg			<15	<3.1	<3.2	<14	<2.3	<2.6	<2.0	<2.0	<1.9	<1.9	<1.8	<2.1	<2.0	<3.1	<26	<2.9	<2.0	<2.8	8.6	<2.0	<9.7	<2.7	<2.3	<1.9	<3.3	<2.2	<2.0	<3.4	14J	<2.2	<6.2
PCB201	ug/kg			<31	<6.4	<6.7	<30	<4.7	<5.4	<4.2	<4.3	<3.9	<3.9	<3.8	<4.3	<4.2	<6.5	<54	28	<4.1	6.1J	16	<4.2	<20	5.7J	<4.9	<4.0	<6.9	<4.5	<4.2	<7.0	24J	<4.7	<13
PCB206	ug/kg			<18	<3.7	<3.8	<17	<2.7	<3.0	<2.4	<2.4	<2.2	<2.2	<2.2	<2.4	<2.4	<3.7	<31	10	<2.3	<3.4	4.3J	<2.4	<11	8.2J	<2.8	<2.3	<3.9	<2.6	<2.4	<4.0	<13	<2.6	39
PCB209	ug/kg			<17	<3.5	<3.6	<16	<2.5	<2.9	<2.3	<2.3	<2.1	<2.1	<2.1	<2.3	<2.3	<3.5	<29	13	<2.2	<3.2	<2.1	<2.2	<11	<3.0	<2.6	<2.1	<3.7	<2.4	<2.2	<3.7	<13	<2.5	<6.9
Total PCBs	ug/kg	22.7	180	639	<2.7	<2.8	811	53.8	60.2	<1.8	<1.8	71.7	82.4	<1.6	13.7	<1.8	317.2	2422	3054	599.3	1235.2	1956.3	317.4	509	1128.9	296.2	<1.7	1054.1	437	13.8	640.8	3047	471.6	839
Organotins																																		
Dibutyltin	ug/kg			<1.1	<1.2	<1.2	<1.1	<0.86	<0.98	<0.77	<0.78	<0.71	<0.72	<0.70	<0.79	<0.78	170	13	<1.1	<0.75	530	54	<0.77	<0.74	150	19	<0.73	120	7.5	<0.77	160	<0.86	<0.85	64
Monobutyltin	ug/kg			<1.9	<1.9	<2.0	<1.8	<1.4	<1.6	<1.3	<1.3	<1.2	<1.2	<1.1	<1.3	<1.3	13	<1.6	<1.8	<1.2	<1.8	9.2	<1.2	<1.2	<1.7	<1.4	<1.2	<2.0	<1.3	<1.2	9.9	<1.4	<1.4	<1.9
Tetrabutyltin	ug/kg			<0.68	<0.70	<0.73	<0.66	<0.52	<0.59	<0.46	<0.47	<0.43	<0.43	<0.42	<0.47	<0.46	<0.71	<0.59	<0.66	<0.45	35	<0.42	<0.46	<0.44	<0.61	<0.53	<0.44	<0.75	<0.50	<0.46	<0.76	<0.51	<0.51	<0.70
Tributyltin	ug/kg			<0.64	<0.66	<0.68	<0.61	<0.48	<0.55	<0.43	<0.43	<0.40	<0.40	<0.39	<0.44	<0.43	180	14	<0.62	<0.42	1300	91	<0.43	<0.41	140	14	<0.41	120	4.7	<0.43	160	<0.48	<0.48	49
SQO Chemistry Line of Evidence Mean Score																																		
SQO LOE				4	4	4	4	3	4	1	1	3	2	1	4	1	4	4	4	4	4	4	4	4	4	4	1	4	3	2	4	4	4	4
ERMqs																																		
Pesticides ERMq				1.85	0.08	0.08	4.10	0.10	0.12	0.05	0.05	0.05	0.05	0.05	0.30	0.05	1.79	5.78	14.94	0.05	10.42	2.83	0.50	0.27	12.50	0.79	0.11	11.02	0.70	0.10	3.11	9.28	1.06	4.72
PCB ERMq				4.81	0.43	0.45	5.63	0.56	0.66	0.28	0.29	0.58	0.62	0.26	0.35	0.28	1.95	15.14	17.07	3.42	6.96	10.91	1.88	3.75	6.35	1.81	0.27	5.99	2.58	0.35	3.71	17.47	2.73	5.05
PAHs ERMq				25.66	9.64	0.91	3.97	0.35	0.67	0.01	0.01	0.02	0.01	0.00	0.86	0.00	0.39	2.07	2.62	0.24	1.06	0.22	1.95	0.59	0.52	0.25	0.01	0.99	0.12	0.05	0.92	8.71	6.86	7.05
Metals ERMq				18.13	15.89	18.74	7.74	0.71	3.11	0.07	0.04	0.15	0.07	0.02	1.11	0.04	0.76	4.72	9.78	1.27	2.63	1.79	6.89	5.65	2.35	2.34	0.06	3.06	0.90	0.33	1.52	4.80	4.00	4.63
Overall Mean ERMq				12.61	6.51	5.05	5.36	0.43	1.14	0.10	0.10	0.20	0.19	0.08	0.65	0.10	1.22	6.93	11.10	1.24	5.27	3.94	2.81	2.56	5.43	1.30	0.11	5.26	1.07	0.20	2.32	10.07	3.67	5.36

Table 7. Summary of Physical Measurements and Chemistry Analytical Results at Berths 240X, Y, and Z Project Area, Port of Los Angeles with a Comparison to Sediment Quality Values (continued)

Analyte	Units	ERL	ERM	Phase II SWM72 2-4 ft	Phase I SWM72 4-6 ft	Phase I SWM73 0-2 ft	Phase I SWM73 4-6 ft	Phase II SWM73 6-8 ft	Phase III SWM73 10-11.5	Phase I SWM74 0-2 ft	Phase II SWM74 2-4 ft	Phase I SWM74 4-6 ft	Phase I SWM75 0-2 ft	Phase I SWM75 4-6 ft	Phase II SWM75 6-8 ft	Phase III SWM75 10-11	Phase III SWM75 11-12	Phase I SWM76 0-2 ft	Phase I SWM76 4-6 ft	Phase II SWM76 6-8 ft	Phase III SWM76 8-10	Phase I SWM77 0-2 ft	Phase I SWM77 4-6 ft	Phase II SWM77 6-8 ft	Phase III SWM77 10-10.5	Phase I SWM78 0-2 ft	Phase II SWM78 2-4 ft	Phase I SWM78 4-6 ft	Phase I SWM79 0-2 ft	Phase II SWM79 2-4 ft	Phase I SWM79 4-6 ft	Phase I SWM80 0-2 ft	Phase I SWM81 0-2 ft	Phase II SWM81 2-4 ft	Phase I SWM81 4-6 ft
Grain Size																																			
Gravel	%			1.3	2.6	0.0	0.0	0.7	0.0	0.0	0.2	0.0	2.5	1.6	1.2	1.7	0.2	0.2	1.7	2.2	3.7	0.3	0.6	0.0	1.3	0.6	0.6	0.6	0.2	2.5	6.5	0.2	0.5	2.0	1.4
Sand	%			89.5	95.7	11.7	23.9	44.9	92.8	22.6	93.7	97.9	73.3	71.5	27.4	14.6	81.6	54.5	63.1	51.9	47.4	44.6	22.0	35.7	96.2	87.2	96.0	98.6	60.1	81.5	59.1	30.4	75.5	96.3	96.0
Silt	%			5.5	0.5	45.2	45.4	29.7	4.6	39.0	3.6	0.6	17.7	16.0	38.8	47.0	12.6	28.6	19.2	23.9	29.8	27.7	43.4	39.0	1.3	7.9	2.3	0.5	21.4	8.7	26.6	44.5	11.6	0.9	1.7
Clay	%			3.6	1.1	43.1	30.7	24.7	2.6	38.4	2.5	1.4	6.5	10.9	32.6	36.6	5.6	16.7	16.0	21.9	19.1	27.4	33.9	25.2	1.3	4.3	1.0	0.3	18.4	7.3	7.8	24.9	12.4	0.9	0.9
General Chemistry																																			
Carbon, Total Organic	%			0.57	0.038J	2.7	3.8	6	0.23	2.5	0.5	0.025J	1.6	1.2	3.3	3.2	0.63	2.3	2.1	2.6	3.7	1.8	3	2	0.11	0.59	0.16	0.059	1.3	0.59	0.17	0.75	0.81	0.034J	0.062
Solids, Total	%			80.2	79.1	49.3	52.7	64.9	78.1	51.2	80.2	78.8	69.2	79.1	61.1	60.6	77.3	55.8	68.1	63.2	63.3	59.3	55.7	61	81.7	76.8	82.6	85	67.2	80.2	83.2	77.3	71.7	88.1	80.6
Trace Metals																																			
Arsenic	mg/kg	8.2	70	2.87	0.22	18.7	38.4B	81.7	2.77	15.1	2.06	0.702	14.4	9.4	17	18.8	5.12	12.2	40.3	36.1	29.2	14.7B	24B	14	1.09	5.55	2.6	1.54	11.5	5.78	5.94	5.27	4.94B	0.528	0.818B
Cadmium	mg/kg	1.2	9.6	0.332B	0.127	1.27	2.65	2.47B	0.192	0.895	0.221B	0.125J	0.712	0.65	2.33B	2.64	0.338	0.733	1.32	1.98B	2.86	0.912	1.91	1.05B	0.0812J	0.34	0.15B	0.0611J	1.54	0.412B	0.193	0.297	0.318	0.0686BJ	0.071J
Chromium	mg/kg	81	370	11.9	4.68	89.3	230	162	13.2B	71.1	14.8	6.28	76.2	31.7	49.6	56B	15.3B	60.2	74.9	86.9	134B	65.2	55.4	39.6	6.11B	24.9	8.37	5.66	46.4	24.1	21	18.1	29.5	5.26	6.62
Copper	mg/kg	34	270	36.2	5.2	330	4130	4430	21.8	225	28.6	5.71	240	232	267	239	23.5	214	1050	1180	2710	205	360	156	3.95	106	16.3	5.19	853	109	20	30	52.5	3.99	4.85
Lead	mg/kg	46.7	218	43	4.65	165	664	670	9.09	123	15.8	1.58	1620	409	554	1190	26.5	105	340	519	1120	135	278	187	1.56	345	34	6.76	137	50.6	6.32	7.77	34.1	1.39	1.7
Mercury	mg/kg	0.15	0.71	2.23	0.101	2.8	27.6	74.2	0.193	2.03	0.317	<0.0165	12.2	11.6	25.1	20.7	0.408	1.83	38.1	57.5	39.4	2.26	20.4	13.9	0.0378	1.72	0.185	0.0236	1.2	1.86	0.042	0.0847	0.403	0.0161J	<0.0161
Nickel	mg/kg	20.9	51.6	7.77	3.45	37.5	36.5	30.4	8.76	33.3	7.81	5.3	46.6	19.9	64.3	299	11	30.1	24	38.2	37.2	27.4	45.5	34	4.63	12.7	5.67	4.44	20.6	13	17.5	15	12.9	3.64	5.05
Selenium	mg/kg			0.119J	<0.0436	1.49	1.22	1.31	0.0983J	1.34	0.184	0.112J	0.58	0.25	1.37	0.719	0.438	0.889	0.438	1.47	0.457	1.25	1.49	1.22	0.1J	0.215	0.0516J	0.0657J	0.347	0.324	1.71	0.366	0.575	<0.0392	0.132
Silver	mg/kg	1	3.7	0.0736J	<0.00447	0.902	1.05	1.07	0.0347J	0.661	0.0769J	<0.00448	0.372	0.187	0.695	0.49	0.0707J	0.444	0.53	0.774	0.889	0.591	0.991	0.448	0.014J	0.105J	0.0455J	0.0113J	0.317	0.181	0.0405J	0.0995J	0.197	0.0118J	0.0176J
Zinc	mg/kg	150	410	145	16.1	652	1580B	1860	40.3B	291	103	21.6	361	396	792	938B	56.2B	289	927	819	3830B	291B	538B	279	15.9B	125	77.3	21.5	726	149	71.3	68.9	103B	56.6	21.4B
Polynuclear Aromatic Hydrocarbons																																			
1,6,7-Trimethylnaphthalene	ug/kg			4J	<2.1	<17	200	770	<2.1	<16	<2.1	<2.1	5.9J	60J	170	2400	120	8.9J	<24	210	190	<14	160	<14	<2.0	67	51J	<2.0	<12	<4.1	<2.0	<2.1	<23	<1.9	<2.1
1-Methylnaphthalene	ug/kg			14	<2.6	<21	97J	1600	<2.7	<20	<2.6	<2.6	7J	62J	100J	8400	180	7.2J	<30	260	280	<17	<19	<17	<2.5	15J	<13	<2.4	<15	<5.2	<2.5	<2.7	<29	<2.4	<2.6
1-Methylphenanthrene	ug/kg			<2.7	<2.8	<22	<42	<85	5.1J	<22	<2.7	<2.8	<3.2	<28	<36	5700	130	<3.9	<32	<35	1100	<19	<20	<18	<2.7	43J	<13	<2.6	<16	<5.5	<2.6	<2.8	150	<2.5	<2.7
2,6-Dimethylnaphthalene	ug/kg			15	<2.1	84J	260	1300	<2.2	74J	6.3J	<2.2	27	100J	240	8700	280	38	70J	260	250	71J	200	73J	<2.1	<11	<10	<2.0	37J	21J	<2.0	<2.2	<24	<1.9	<2.1
2-Methylnaphthalene	ug/kg	70	670	25	<2.3	24J	80J	2300	<2.4	<18	<2.3	<2.3	10J	27J	130J	3300	81	13J	<27	100J	370	<16	31J	27J	<2.3	29J	<11	<2.2	<14	6.7J	<2.2	<2.4	<26	<2.1	<2.3
Acenaphthene	ug/kg	16	500	25	3.3J	31J	230	2300	<1.9	<15	3.5J	<1.9	28	370	240	36000	890	9.5J	83J	2400	610	27J	1100	120	<1.8	350	120	<1.8	27J	10J	<1.8	<2.0	38J	<1.7	<1.9
Acenaphthylene	ug/kg	44	640	26	3.5J	270	430	780	40	250	20	<1.8	70	240	130J	450	29	97	330	440	150	290	210	71J	<1.8	86	17J	<1.7	140	51	<1.7	<1.9	220	<1.6	<1.8
Anthracene	ug/kg	85.3	1100	59	<1.7	450	1500	4300	15	400	34	<1.7	130	730	1000	42000	490	150	600	2500	1300	420	920	500	<1.6	650	610	5.6J	260	86	<1.6	<1.7	330	<1.5	<1.6
Benzo (a) Anthracene	ug/kg	261	1600	72	4.2J	430	5400	10000	200	410	32	<2.6	160	1100	2200	6300	180	190	2000	3700	2700	380	1300	370	<2.5	370	170	4.2J	810	120	<2.4	4.6J	1400	4.2J	<2.5
Benzo (a) Pyrene	ug/kg	430	1600	230	12J	2200	5600	9600	500	1800	190	<1.6	720	1600	2100	1100	120	800	4800	5500	2400	1700	2000	600	<1.6	310	75	7.6J	1400	550	<1.5	<1.7	1200	5.3J	<1.6
Benzo (b) Fluoranthene	ug/kg			230	13	2300	5700	8200	280	2100	190	<2.0	840	1300	1600	1100	130	990	4600	5200	2200	2100	2100	580	<1.9	340	79	7.8J	1500	540	<1.9	<2.0	1500	5.6J	<1.9
Benzo (e) Pyrene	ug/kg			120	8.3J	960	3800	6600	310	820	53	<2.9	410	1000	1400	710	74	540	2800	3700	1700	1000	1500	440	<2.8	170	48J	4.4J	790	170	<2.8	<3.0	830	3.1J	<2.8
Benzo (g,h,i) Perylene	ug/kg			120	4.4J	860	2700	5000	530	670	74	<1.7	350	690	910	350	52	400	2600	2200	1300	610	920	290	<1.6	140	26J	2.9J	570	240	<1.6	<1.7	340	3.1J	<1.6
Benzo (k) Fluoranthene	ug/kg			180	12J	2600	4600	7400	300	1700	160	<2.4	560	1500	1700	940	100	610	3300	4300	1900	1400	1700	520	<2.4	310	74	8.3J	1300	470	<2.3	<2.5	1500	5.3J	<2.4
Biphenyl	ug/kg			10J	<2.0	<16	<30	460	<2.0	<15	<2.0	<2.0	4.9J	32J	47J	6100	140	6.1J	<23	64J	90	<13	28J	<13	<1.9	<10	<9.6	<1.9	<12	<3.9	<1.9	<2.0	<22	<1.8	<2.0
Chrysene	ug/kg	384	2800	100	4J	750	6500	13000	250	710	51	<1.9	310	1300	2600	6400	170	430	2700	4900	3600	770	1400	510	<1.8	370	150	5.8J	1200	150	<1.8	<2.0	2300	5.4J	<1.9
Dibenz (a,h) Anthracene	ug/kg	63.4	260	26	<1.3	300	880	1900	<1.4	210	20	<1.3	120	210	220	77	10J	130	750	730	480	220	240	62J	<1.3	42J	<6.4	<1.2	200	58	<1.3	<1.4	100J	<1.2	<1.3
Fluoranthene	ug/kg	600	5100	130	3.8J	410	9000	22000	350	300	32	<2.0	180	2300	2300	47000	1200	160	2300	7000	6000	300	2200	46J	<1.9	1800	1100	18	1500	140	<1.9	<2.0	9100	10J	<1.9
Fluorene	ug/kg	19	540	37	4.1J	44J	310	3500	3.2J	41J	5.1J	3.6J	45	530	360	43000	1100	24	100J	1600	930	36J	710	140	<1.7	340	76	<1.6	57J	12J	<1.7	<1.8	<19	2.4J	<1.7
Indeno (1,2,3-c,d) Pyrene	ug/kg			130	5.6J	870	2400	4700	430	700	87	<1.7	310	630	980	380	51	350	2100	2600	1300	610	810	300	<1.6	120	33J	<1.5	520	270	<1.6	<1.7	380	3.4J	<1.6
Naphthalene	ug/kg	160	2100	100	<2.1	37J	280	13000	6.7J	21J	5J	<2.1	20	97J	180	3500	12J	18	170	2900	1300	<14	68J	58J	<2.0	120	57J	2.4J	26J	14J	<2.0	<2.1	<23	<1.9	<2.0
Perylene	ug/kg			<2.4	<2.4	410	1400	2200	130	340	<2.4	<2.5	160	400	<32	310	22	260	990	1400	720	400	640	20J	<2.4	65	<12	<2.3	300	70	<2.3	4.1J	270	<2.2	<2.4
Phenanthrene	ug/kg	240	1500	130	<2.7	240	1700	16000	35	190	17	<2.7	170	2400	1500	120000	3700	99	660	4500	3200	170	3500	420	<2.6	560	330	6.1J	280	91	<2.6	<2.8	180	4.6J	<2.7
Pyrene	ug/kg	665	2600	200	15	480	10000	25000	520	400	42	25	340	3500	5800	31000	1000	270	6900	11000	6900	460	5400	2500	4.3J	1700	740	23	1800	190	<2.0	3.5J	8000	16	<2.0
Total Detectable PAHs	ug/kg	4022	44792	1983	93.2	13750	63067	161910	3905	11136	1021.9	28.6	4977.8	20178	25907	375217	10261	5600.7	37853	67464	40970	10964	27137	7647	4.3	7997	3756	96.1	12717	3259.7	<1.3	12.2	27838	68.4	<1.3
Chlorinated Pesticides																																			
2,4'-DDD	ug/kg			<0.25	<0.25	5.2	<0.38	<0.31	<0.26	2.5	0.52J	<0.25	<0.29	<0.25	<0.33	<0.33	<0.26	<0.36	<0.29	<0.32	<0.32	<0.34	<0.36	<0.33	<0.25	<0.26	<0.24	<0.24	<0.30	0.6J	<0.24	<0.26	0.52J	<0.23	<0.25
2,4'-DDE	ug/kg			1.4	<0.22	36	<0.34	27	<0.23	20	3.7	<0.23	11	9.6	<0.29	<0.29	<0.23	8.7	17	34	<0.28	16	<0.32	<0.29	<0.22	6.8	0.39J	<0.21	6.9	7.4	<0.21	<0.23	6.8	<0.20	<0.22
2,4'-DDT	ug/kg			<0.17	<0.18	<0.28	<0.27	<0.22	<0.18	<0.27	<0.17	<0.18	<0.20	<0.18	<0.23	<0.23	<0.18	<0.25	<0.21	<0.22	<0.22	<0.24	<0.25	<0.23	<0.17	<0.18	<0.17	<0.16	<0.21	<0.17	<0.17	<0.18	<0.20	<0.16	<0.17
4,4'-DDD	ug/kg	2	20	0.62J	<0.33	18	110	7.8	<0.33	10	1.7	<0.33	4.5	4.9	0.84J	<0.43	<0.33	2.7	7.5	5.2	<0.41	5.4	2	<0.42	<0.32	2	<0.31	<0.30	2.3	1.7	<0.31	<0.33	2.2	<0.29	<0.32
4,4'-DDE	ug/kg	2.2	27	4	<0.38	110	430	81	<0.38	86	15	<0.38	43	47	0.88J	<0.50	<0.39	34	78	190	<0.47	73	4.8	<0.49	<0.37	23	0.53J	<0.35	27	32	<0.36	<0.39	27	0.36J	<0.37
4,4'-DDT	ug/kg	1	7	<0.41	<0.41	<0.67	<0.62	<0.51	<0.42	<0.64	<0.41	<0.42	<0.47	<0.41	<0.54	<0.54	<0.42	<0.59	<0.48	<0.52	<0.52	<0.55	<0.59	<0.54	<0.40	<0.43	<0.40	<0.39	<0.49	<0.41	<0.39	<0.42	<0.46	<0.37	<0.41
Aldrin	ug/kg			<0.39	<0.39	<0.63	<0.59	<0.48	<0.40	<0.60	<0.39	<0.39	<0.45	<0.39	<0.51	<0.51	<0.40	<0.55	<0.45	<0.49	<0.49	<0.52	<0.55	<0.51	<0.38	<0.40	<0.37	<0.36	<0.46	<0.39	<0.37	<0.40	<0.43	<0.35	<0.38
Alpha Chlordane	ug/kg			<0.32	<0.33	<0.52	<0.49	<0.40	<0.33	<0.50	<0.32	<0.33	<0.37	<0.33	<0.42	<0.43	<0.33	<0.46	<0.38	<0.41	<0.41	<0.44	<0.46	<0.42	<0.32	<0.34	<0.31	<0.30	<0.38	<0.32	<0.31	<0.33	<0.36	<0.29	<0.32
Alpha-BHC	ug/kg			<0.37	<0.37	<0.60	<0.56	<0.45	<0.38	<0.57	<0.37	<0.37	<0.43	<0.37	<0.48	<0.49	<0.38	<0.53	<0.43	<0.47	<0.46	<0.50	<0.53	<0.48	<0.36	<0.38	<0.36	<0.35	<0.44	<0.37	<0.35	<0.38	<0.41	<0.33	<0.37
Beta-BHC	ug/kg			<0.32	<0.32	<0.52	<0.48	<0.39	<0.33	<0.50	<0.32	<0.32	<0.37	<0.32	<0.42	<0.42	<0.33	<0.46	<0.37	<0.40	<0.40	<0.43	<0.46	<0.42	<0.31	<0.33	<0.31	<0.30	<0.38	<0.32	<0.31	<0.33	<0.36	<0.29	<0.32
Chlordane	ug/kg			<5.0	<5.1	<8.1	<7.6	<6.2	<5.1	<7.8	<5.0	<5.1	<5.8	<5.1	<6.6	<6.6	<5.2	<7.2	<5.9	<6.3	<6.3	<6.8	<7.2	<6.6	<4.9	<5.2	<4.9	<4.7	<6.0	<5.0	<4.8	<5.2	<5.6	<4.5	<5.0
Cis-nonachlor	ug/kg			<0.67	<0.68	<1.1	<1.0	<0.83	<0.69	<1.1	<0.67	<0.68	<0.78	<0.68	<0.88	<0.89	<0.70	<0.96	<0.79	<0.85	<0.85	<0.91	<0.97	<0.88	<0.66	<0.70	<0.65	<0.63	<0.80	<0.67	<0.65	<0.70	<0.75	<0.61	<0.67
Delta-BHC	ug/kg			<0.40	<0.40	<0.65	<0.60	<0.49	<0.41	<0.62	<0.40	<0.40	<0.46	<0.40	<0.52	<0.52	<0.41	<0.57	<0.47	<0.50	<0.50	<0.54	<0.57	<0.52	<0.39	<0.41	<0.39	<0.37	<0.47	<0.40	<0.38	<0.41	<0.44	<0.36	<0.39
Dieldrin	ug/kg	0.02	8	<0.28	<0.29	<0.46	50	23	<0.29	<0.44	<0.28	<0.29	<0.33	<0.29	<0.37	<0.37	<0.29	<0.41	<0.33	5.5	<0.36	2.5	0.79J	<0.37	<0.28	<0.30	<0.27	<0.27	<0.34	1.3	<0.27	<0.29	0.93J	<0.26	<0.28
Endosulfan I	ug/kg			<0.44	<0.45	<0.72	<0.68	<0.55	<0.46	<0.70	<0.44	<0.45	<0.51	<0.45	<0.58	<0.59	<0.46	<0.64	<0.52	<0.56	<0.56	<0.60	<0.64	<0.58	<0.44	<0.46	<0.43	<0.42	<0.53	<0.44	<0.43	<0.46	<0.50	<0.40	<0.44
Endosulfan II	ug/kg			<0.22	<0.22	<0.36	<0.33	<0.27	<0.22	<0.34	<0.22	<0.22	<0.25	<0.22	<0.29	<0.29	<0.23	<0.31	<0.26	<0.28	<0.28	<0.30	<0.31	<0.29	<0.21	<0.23	<0.21	<0.21	<0.26	<0.22	<0.21	<0.23	<0.24	<0.20	<0.22
Endosulfan Sulfate	ug/kg			<0.33	<0.33	<0.53	<0.50	<0.41	<0.34	<0.51	<0.33	<0.33	<0.38	<0.33	<0.43	<0.43	<0.34	<0.47	<0.39	<0.42	<0.42	<0.44	<0.47	<0.43	<0.32	<0.34	<0.32	<0.31	<0.39	<0.33	<0.32	<0.34	<0.37	<0.30	<0.33
Endrin	ug/kg			<0.25	<0.25	<0.41	<0.38	<0.31	<0.26	<0.39	<0.25	<0.26	<0.29	<0.25	<0.33	<0.33	<0.26	<0.36	<0.30	<0.32	<0.32	<0.34	<0.36	<0.33	<0.25	<0.26	<0.24	<0.24	<0.30	<0.25	<0.24	<0.26	<0.28	<0.23	<0.25
Endrin Aldehyde	ug/kg			<0.24	<0.25	<0.40	<0.37	<0.30	<0.25	<0.38	<0.24	<0.25	<0.28	<0.25	<0.32	<0.32	<0.25	<0.35	<0.29	<0.31	<0.31	<0.33	<0.35	<0.32	<0.24	<0.25	<0.24	<0.23	<0.29	<0.24	<0.23	<0.25	<0.27	<0.22	<0.24
Endrin Ketone	ug/kg			<0.37	<0.38	<0.61	<0.57	<0.46	<0.38	<0.59	<0.37	<0.38	<0.43	<0.38	<0.49	<0.50	<0.39	<0.54	<0.44	<0.48	<0.47	<0.51	<0.54	<0.49	<0.37	<0.39	<0.36	<0.35	<0.45	<0.37	<0.36	<0.39	<0.42	<0.34	<0.37
Gamma Chlordane	ug/kg			<0.32	<0.33	<0.52	<0.49	<0.40	<0.33	<0.50	<0.32	<0.33	<0.37	<0.33	<0.42	<0.43	<0.33	<0.46	<0.38	<0.41	<0.41	<0.44	<0.46	<0.42	<0.32	<0.34	<0.31	<0.30	<0.38	<0.32	<0.31	<0.33	<0.36	<0.29	<0.32
Gamma-BHC	ug/kg			<0.28	<0.29	0.51J	<0.43	<0.35	<0.29	<0.45	<0.28	<0.29	<0.33	<0.29	<0.37	<0.38	<0.30	<0.41	<0.34	<0.36	<0.36	<0.39	<0.41	<0.37	<0.28	<0.30	<0.28	<0.27	<0.34	<0.28	<0.27	<0.30	<0.32	<0.26	<0.28
Heptachlor	ug/kg			<0.28	<0.28	<0.45	<0.42	<0.34	<0.29	<0.44	<0.28	<0.28	<0.32	<0.28	<0.36	<0.37	<0.29	<0.40	<0.33	<0.35	<0.35	<0.38	<0.40	<0.37	<0.27	<0.29	<0.27	<0.26	<0.33	<0.28	<0.27	<0.29	<0.31	<0.25	<0.28
Heptachlor Epoxide	ug/kg			<0.23	<0.23	<0.37	<0.35	<0.28	<0.24	<0.36	<0.23	<0.23	<0.27	<0.23	<0.30	<0.30	<0.24	<0.33	<0.27	<0.29	<0.29	<0.31	<0.33	<0.30	<0.22	<0.24	<0.22	<0.22	<0.27	<0.23	<0.22	<0.24	<0.26	<0.21	<0.23
Methoxychlor	ug/kg			<0.21	<0.21	<0.34	<0.32	<0.26	<0.21	<0.33	<0.21	<0.21	<0.24	<0.21	<0.27	<0.28	<0.22	<0.30	<0.25	<0.26	<0.26	<0.28	<0.30	<0.27	<0.20	<0.22	<0.20	<0.20	<0.25	<0.21	<0.20	<0.22	<0.23	<0.19	<0.21
Total Detectable Chlordane (a,g)	ug/kg	0.5	6	<0.32	<0.33	<0.52	<0.49	<0.4	<0.33	<0.5	<0.32	<0.33	<0.37	<0.33	<0.42	<0.43	<0.33	<0.46	<0.38	<0.41	<0.41	<0.44	<0.46	<0.42	<0.32	<0.34	<0.31	<0.3	<0.38	<0.32	<0.31	<0.33	<0.36	<0.29	<0.32
Total Detectable DDTs	ug/kg	1.58	46.1	6.02	<0.18	169.2	540	115.8	<0.18	118.5	20.92	<0.18	58.5	61.5	1.72	<0.23	<0.18	45.4	102.5	229.2	<0.22	94.4	6.8	<0.23	<0.17	31.8	0.92	<0.16	36.2	41.7	<0.17	<0.18	36.52	0.36	<0.17
Toxaphene	ug/kg			<11	<11	<17	<16	<13	<11	<17	<11	<11	<12	<11	<14	<14	<11	<15	<12	<13	<13	<14	<15	<14	<10	<11	<10	<10	<13	<11	<10	<11	<12	<9.6	<11
Trans-nonachlor	ug/kg			<0.68	<0.69	<1.1	<1.0	<0.85	<0.70	<1.1	<0.68	<0.70	<0.79	<0.69	<0.90	<0.91	<0.71	<0.98	<0.81	<0.87	<0.87	<0.93	<0.99	<0.90	<0.67	<0.72	<0.66	<0.65	<0.82	<0.68	<0.66	<0.71	<0.77	<0.62	<0.68

Table 7. Summary of Physical Measurements and Chemistry Analytical Results at Berths 240X, Y, and Z Project Area, Port of Los Angeles with a Comparison to Sediment Quality Values (continued)

Analyte	Units	ERL	ERM	Phase II	Phase I	Phase I	Phase I	Phase II	Phase III	Phase I	Phase II	Phase I	Phase I	Phase I	Phase II	Phase III	Phase III	Phase I	Phase I	Phase II	Phase III	Phase I	Phase I	Phase I	Phase I	Phase I	Phase II	Phase I	Phase I	Phase I	Phase II	Phase I
				SWM72	SWM 72	SWM 73	SWM 73	SWM73	SWM73	SWM 74	SWM74	SWM 74	SWM 75	SWM 75	SWM75	SWM75	SWM75	SWM 76	SWM 76	SWM76	SWM76	SWM 77	SWM 77	SWM77	SWM77	SWM 78	SWM78	SWM 78	SWM 79	SWM79	SWM 79	SWM 80	SWM 81	SWM81	SWM 81
				2-4 ft	4-6 ft	0-2 ft	4-6 ft	6-8 ft	10-11.5	0-2 ft	2-4 ft	4-6 ft	0-2 ft	4-6 ft	6-8 ft	10-11	11-12	0-2 ft	4-6 ft	6-8 ft	8-10	0-2 ft	4-6 ft	6-8 ft	10-10.5	0-2 ft	2-4 ft	4-6 ft	0-2 ft	2-4 ft	4-6 ft	0-2 ft	0-2 ft	2-4 ft	4-6 ft
PCB Congeners																																		
PCB008	ug/kg			<2.2	<2.3	3.9J	17J	<2.8	<2.3	<3.5	<2.2	<2.3	8.2J	<2.3	<2.9	<3.0	<2.3	<3.2	43	9.4	<2.8	<3.0	<3.2	<2.9	<2.2	4.1J	<2.2	<2.1	<2.7	<2.2	<2.2	<2.3	<2.5	<2.0	<2.2
PCB018	ug/kg			<2.2	<2.2	19	220	<2.7	<2.2	7.8J	<2.2	<2.2	33	<2.2	<2.9	<2.9	<2.3	14	160	130	<2.8	11	<3.1	<2.9	<2.1	12	<2.1	<2.1	7.6	9.7	<2.1	<2.3	4J	<2.0	<2.2
PCB028	ug/kg			<2.2	<2.2	13	78	<2.7	<2.2	5.3J	<2.2	<2.2	14J	<2.2	<2.8	<2.9	<2.2	9.8	97	<2.7	<2.7	7.1J	<3.1	<2.8	<2.1	6.4J	<2.1	<2.0	4.5J	5J	<2.1	<2.2	<2.4	<2.0	<2.2
PCB037	ug/kg			<2.2	<2.2	4.3J	36J	<2.7	<2.3	<3.5	<2.2	<2.3	22	8.6	<2.9	<2.9	<2.3	3.8J	49	<2.8	44	3.3J	<3.2	<2.9	<2.2	2.4J	<2.2	<2.1	<2.6	3.6J	<2.1	<2.3	<2.5	<2.0	<2.2
PCB044	ug/kg			4.2J	<2.2	20	170	<2.7	<2.3	7.7J	3.4J	<2.2	22	5.7J	<2.9	<2.9	<2.3	14	78	42	39	11	4.3J	12	<2.2	5.7J	<2.1	<2.1	6.8J	8.6	<2.1	<2.3	3.4J	<2.0	<2.2
PCB049	ug/kg			12	<2.2	14	100	180	<2.2	6.4J	4.2J	<2.2	14J	5.3J	<2.8	<2.9	<2.2	9.2	55	97	28	9.7	28	52	<2.1	3.1J	<2.1	<2.0	4.7J	11	<2.1	<2.2	2.6J	<2.0	<2.2
PCB052	ug/kg			<2.5	<2.6	31	280	<3.1	<2.6	14	3J	<2.6	29	13	<3.3	<3.4	<2.6	22	89	47	69	21	4.8J	9.7	<2.5	7.4	<2.5	<2.4	12	10	<2.4	<2.6	7.1	<2.3	<2.5
PCB066	ug/kg			<2.2	<2.2	20	75	<2.7	<2.2	8.2J	2.6J	<2.2	17	3.5J	<2.8	<2.9	<2.2	13	65	20	45	11	<3.1	<2.8	<2.1	4.4J	<2.1	<2.0	5.9J	7.1	<2.1	<2.2	3.2J	<2.0	<2.2
PCB070	ug/kg			<2.3	<2.4	21	210	<2.9	<2.4	7.4J	2.4J	<2.4	19	5.4J	<3.0	<3.1	<2.4	15	76	30	61	13	<3.3	<3.1	<2.3	5J	<2.3	<2.2	6.3J	7.3	<2.2	<2.4	3.2J	<2.1	<2.3
PCB074	ug/kg			<2.2	<2.2	8.3J	80	10	<2.3	<3.5	<2.2	<2.2	8.2J	<2.2	<2.9	<2.9	<2.3	6.6J	33	13	15	5.3J	<3.2	<2.9	<2.2	<2.3	<2.1	<2.1	2.8J	3.4J	<2.1	<2.3	<2.5	<2.0	<2.2
PCB077	ug/kg			<2.2	<2.2	4.9J	<17	<2.7	<2.2	<3.4	<2.2	<2.2	<5.0	<2.2	<2.9	<2.9	<2.3	<3.1	11J	<2.8	<2.8	3.1J	<3.1	<2.9	<2.1	<2.3	<2.1	<2.1	<2.6	<2.2	<2.1	<2.3	<2.4	<2.0	<2.2
PCB081	ug/kg			<2.2	<2.3	<3.6	<17	<2.7	<2.3	<3.5	<2.2	<2.3	<5.2	<2.3	<2.9	<2.9	<2.3	<3.2	<5.2	4.3J	<2.8	<3.0	<3.2	<2.9	<2.2	<2.3	<2.2	<2.1	<2.7	<2.2	<2.1	<2.3	<2.5	<2.0	<2.2
PCB087	ug/kg			<2.2	<2.3	37	210	84	<2.3	13	<2.2	<2.3	22	15	<2.9	<2.9	<2.3	20	52	39	34	21	45	<2.9	<2.2	3.9J	<2.2	<2.1	12	4.9J	<2.1	<2.3	8.6	<2.0	<2.2
PCB099	ug/kg			<2.2	<2.2	15	140	72	<2.3	5.8J	<2.2	<2.2	8.5J	3.6J	<2.9	<2.9	<2.3	9.6	21	23	61	8.5	<3.2	<2.9	<2.2	<2.3	<2.1	<2.1	5J	3.7J	<2.1	<2.3	3.2J	<2.0	<2.2
PCB101	ug/kg			<2.3	<2.4	42	450	170	<2.4	16	5.4J	<2.4	24	12	<3.0	<3.1	<2.4	26	62	64	120	26	<3.3	<3.0	<2.3	4.3J	<2.3	<2.2	14	13	<2.2	<2.4	8.7	<2.1	<2.3
PCB105	ug/kg			<2.4	<2.4	17	130	55	<2.5	7J	<2.4	<2.4	12J	5.8J	<3.2	<3.2	<2.5	9.7	31	33	29	12	23	<3.2	<2.4	<2.5	<2.3	<2.3	6.6J	6.3	<2.3	<2.5	4.1J	<2.2	<2.4
PCB110	ug/kg			<2.1	<2.1	43	370	170	<2.1	16	4.6J	<2.1	24	12	<2.7	<2.7	<2.1	26	54	52	110	24	<3.0	<2.7	<2.0	4J	<2.0	<1.9	14	10	<2.0	<2.1	9	<1.9	<2.1
PCB114	ug/kg			<2.1	<2.1	<3.4	<16	<2.6	<2.2	<3.3	<2.1	<2.1	<4.9	<2.1	<2.8	<2.8	<2.2	<3.0	<5.0	<2.7	<2.7	<2.8	<3.0	<2.8	<2.1	<2.2	<2.0	<2.0	<2.5	<2.1	<2.0	<2.2	<2.4	<1.9	<2.1
PCB118	ug/kg			<2.2	<2.3	36	320	110	<2.3	15	4.3J	<2.3	19	10	<2.9	<3.0	<2.3	21	45	45	97	21	<3.2	<2.9	<2.2	3.6J	<2.2	<2.1	12	9	<2.2	<2.3	7.8	<2.0	<2.2
PCB119	ug/kg			<2.1	<2.2	<3.5	<16	<2.7	<2.2	<3.4	<2.1	<2.2	<5.0	<2.2	<2.8	<2.8	<2.2	<3.1	<5.1	18	5.7J	<2.9	<3.1	<2.8	<2.1	<2.2	<2.1	<2.0	<2.6	<2.1	<2.1	<2.2	<2.4	<2.0	<2.1
PCB123	ug/kg			<2.1	<2.1	<3.4	<16	<2.6	<2.1	<3.3	<2.1	<2.1	<4.8	<2.1	<2.7	<2.8	<2.2	<3.0	8J	<2.6	14	<2.8	<3.0	<2.7	<2.0	<2.2	<2.0	<2.0	<2.5	<2.1	<2.0	<2.2	<2.3	<1.9	<2.1
PCB126	ug/kg			<2.0	<2.1	7.4J	<16	<2.5	<2.1	3.4J	<2.0	<2.1	9.4J	<2.1	<2.7	<2.7	<2.1	<2.9	8.7J	<2.6	<2.6	4.7J	<2.9	<2.7	<2.0	<2.1	<2.0	<1.9	3.2J	<2.0	<2.0	<2.1	3.1J	<1.9	<2.0
PCB128	ug/kg			<2.1	<2.1	7.8J	71	22	<2.1	3.5J	<2.1	<2.1	<4.8	<2.1	<2.7	<2.7	<2.1	5.1J	8.4J	8.3	15	7.2J	<3.0	<2.7	<2.0	<2.1	<2.0	<1.9	3.2J	2.7J	<2.0	<2.1	<2.3	<1.9	<2.0
PCB138/158	ug/kg			<4.4	<4.4	51	450	27	<4.5	21	5.4J	<4.4	26	15	<5.7	<5.8	<4.5	30	67	74	50	34	<6.3	<5.7	<4.3	8.7	<4.2	<4.1	19	11	<4.2	<4.5	13	<4.0	<4.4
PCB149	ug/kg			<2.1	<2.1	31	300	77	<2.2	12	4J	<2.1	13J	8.8	<2.8	<2.8	<2.2	17	41	43	53	18	<3.0	<2.8	<2.1	4.8J	<2.0	<2.0	11	6.6	<2.0	<2.2	6.2J	<1.9	<2.1
PCB151	ug/kg			<2.1	<2.1	14	96	35	<2.2	5.9J	<2.1	<2.2	9.2J	5.3J	<2.8	<2.8	<2.2	7.3J	20	14	12	8.3J	10	<2.8	<2.1	2.5J	<2.1	<2.0	5.4J	<2.1	<2.0	<2.2	4J	<1.9	<2.1
PCB153	ug/kg			<2.1	<2.1	48	450	110	<2.1	19	4.8J	<2.1	23	13	<2.7	<2.7	<2.2	29	63	56	82	29	<3.0	<2.7	<2.0	8	<2.0	<2.0	17	10	<2.0	<2.2	11	<1.9	<2.1
PCB156	ug/kg			<2.4	<2.4	5.5J	43J	<2.9	<2.4	<3.7	<2.4	<2.4	<5.5	3.5J	<3.1	<3.1	<2.5	3.5J	12J	<3.0	10	4.6J	<3.4	<3.1	<2.3	<2.5	<2.3	<2.2	<2.8	<2.4	<2.3	<2.5	<2.7	<2.2	<2.4
PCB157	ug/kg			4.4J	<2.3	6.8J	23J	33	<2.3	<3.5	<2.2	<2.3	<5.2	4.7J	<2.9	<3.0	<2.3	<3.2	12J	47	9.7	4.2J	20	30	<2.2	<2.3	<2.2	<2.1	3.2J	5J	<2.2	<2.3	3.3J	<2.0	<2.2
PCB167	ug/kg			<2.2	<2.2	<3.5	24J	<2.7	<2.2	<3.4	<2.2	<2.2	<5.0	<2.2	<2.8	<2.9	<2.2	<3.1	<5.1	<2.7	<2.7	<2.9	<3.1	<2.8	<2.1	<2.3	<2.1	<2.0	4.8J	<2.2	<2.1	<2.2	<2.4	<2.0	<2.1
PCB168	ug/kg			<2.0	<2.0	<3.2	<15	<2.4	<2.0	<3.1	<2.0	<2.0	<4.6	<2.0	<2.6	<2.6	<2.1	<2.8	<4.7	<2.5	<2.5	<2.7	<2.9	<2.6	<1.9	<2.1	<1.9	<1.9	<2.4	<2.0	<1.9	<2.1	<2.2	<1.8	<2.0
PCB169	ug/kg			<1.9	<2.0	<3.1	<15	<2.4	<2.0	<3.0	<1.9	<2.0	<4.5	<2.0	<2.5	<2.6	<2.0	<2.8	<4.6	<2.5	<2.5	<2.6	<2.8	<2.5	<1.9	<2.0	<1.9	<1.8	6.7J	<1.9	<1.9	<2.0	<2.2	<1.8	<1.9
PCB170	ug/kg			<1.8	<1.8	12	100	28	<1.9	4.5J	<1.8	<1.8	7.4J	3.8J	<2.4	<2.4	<1.9	5.9J	16	<2.3	10	7.1J	<2.6	<2.4	<1.8	4.7J	<1.8	<1.7	5J	3.7J	<1.8	<1.9	2.3J	<1.7	<1.8
PCB177	ug/kg			<2.1	<2.2	4.6J	48	<2.7	<2.2	<3.4	<2.1	<2.2	<5.0	<2.2	<2.8	<2.8	<2.2	<3.1	5.9J	4.9J	<2.7	3J	<3.1	<2.8	<2.1	<2.2	<2.1	<2.0	<2.6	<2.1	<2.1	<2.2	<2.4	<2.0	<2.1
PCB180	ug/kg			<2.2	<2.2	20	180	23	<2.2	8.3J	<2.2	<2.2	11J	6.2J	<2.9	<2.9	<2.3	12	29	23	16	15	<3.1	<2.9	<2.1	8.9	<2.1	<2.1	12	4.5J	<2.1	<2.3	4.9J	<2.0	<2.2
PCB183	ug/kg			<2.1	<2.1	4.8J	47J	9	<2.2	<3.3	<2.1	<2.2	<4.9	<2.1	<2.8	<2.8	<2.2	3.2J	6.5J	5.8J	3.8J	2.9J	<3.0	<2.8	<2.1	<2.2	<2.1	<2.0	3J	<2.1	<2.0	<2.2	<2.4	<1.9	<2.1
PCB184	ug/kg			<2.1	<2.1	<3.4	<16	<2.6	<2.2	<3.3	<2.1	<2.2	<4.9	<2.1	<2.8	<2.8	<2.2	<3.0	<5.0	<2.7	<2.7	<2.9	<3.1	<2.8	<2.1	<2.2	<2.1	<2.0	<2.5	<2.1	<2.0	<2.2	<2.4	<1.9	<2.1
PCB187	ug/kg			<2.2	<2.2	12	100	15	<2.2	4.8J	<2.2	<2.2	6J	3.8J	<2.8	<2.9	<2.2	7.8J	15	11	8.9	8.2J	<3.1	<2.8	<2.1	3.8J	<2.1	<2.0	15	2.4J	<2.1	<2.2	3.2J	<2.0	<2.1
PCB189	ug/kg			<2.1	<2.1	<3.4	<16	<2.6	<2.1	<3.3	<2.1	<2.1	<4.8	<2.1	<2.7	<2.8	<2.2	<3.0	<4.9	<2.6	<2.6	<2.8	<3.0	<2.7	<2.0	<2.2	<2.0	<2.0	<2.5	<2.1	<2.0	<2.2	<2.3	<1.9	<2.1
PCB194	ug/kg			<1.7	<1.7	<2.8	53	<2.1	<1.7	<2.7	<1.7	<1.7	<3.9	<1.7	<2.2	<2.3	<1.8	2.9J	<4.0	<2.2	<2.2	4.3J	<2.5	<2.2	<1.7	2.3J	<1.7	<1.6	12	<1.7	<1.6	<1.8	<1.9	<1.5	<1.7
PCB195	ug/kg			<2.0	<2.0	<3.2	<15	<2.4	<2.0	<3.1	<2.0	<2.0	<4.5	<2.0	<2.6	<2.6	<2.0	<2.8	<4.6	<2.5	<2.5	<2.6	<2.8	<2.6	<1.9	<2.0	<1.9	<1.8	<2.3	<2.0	<1.9	<2.0	<2.2	<1.8	<1.9
PCB201	ug/kg			<4.1	<4.1	<6.6	<31	<5.0	<4.2	<6.4	<4.1	<4.2	<9.5	<4.1	<5.4	<5.4	<4.2	<5.9	<9.6	<5.2	<5.2	<5.5	<5.9	<5.4	<4.0	<4.3	<4.0	<3.9	34	<4.1	<3.9	<4.2	<4.6	<3.7	<4.1
PCB206	ug/kg			<2.3	<2.4	<3.8	<18	<2.9	<2.4	<3.6	<2.3	<2.4	<5.4	<2.4	<3.0	<3.1	<2.4	<3.3	<5.5	<2.9	<2.9	<3.1	<3.3	<3.1	<2.3	<2.4	<2.3	<2.2	59	<2.3	<2.2	<2.4	<2.6	<2.1	<2.3
PCB209	ug/kg			<2.2	<2.2	<3.6	<17	<2.7	<2.2	<3.4	<2.2	<2.2	<5.1	<2.2	<2.9	<2.9	<2.3	<3.1	<5.1	<2.8	<2.8	<3.0	<3.1	<2.9	<2.1	<2.3	<2.1	<2.1	<2.6	<2.2	<2.1	<2.3	<2.4	<2.0	<2.2
Total PCBs	ug/kg	22.7	180	20.6	<1.7	574.3	4871	1230	<1.7	212	44.1	<1.7	400.9	164	<2.2	<2.3	<1.8	343.4	1333.5	953.7	1042.1	358.5	135.1	103.7	<1.7	110	<1.7	<1.6	327.7	158.5	<1.6	<1.8	115.9	<1.5	<1.7
Organotins																																		
Dibutyltin	ug/kg			700	<0.76	140	<1.1	<0.92	<0.77	160	<0.75	<0.76	49	<0.76	<0.98	<0.99	<0.78	95	20	<0.95	<0.95	65	<1.1	<0.98	<0.73	7.5	<0.73	<0.71	62	15	<0.72	<0.78	30	<0.68	<0.74
Monobutyltin	ug/kg			13	<1.2	17	<1.8	<1.5	<1.2	<1.9	<1.2	<1.2	<1.4	<1.2	<1.6	<1.6	<1.3	<1.7	<1.4	<1.5	<1.5	<1.6	<1.7	<1.6	<1.2	<1.3	<1.2	<1.1	4.4J	<1.2	<1.2	<1.3	<1.4	<1.1	<1.2
Tetrabutyltin	ug/kg			28	<0.45	<0.73	<0.68	<0.55	<0.46	<0.70	<0.45	<0.45	<0.52	<0.45	<0.59	<0.59	<0.46	<0.64	<0.53	<0.57	<0.57	<0.60	<0.64	<0.59	<0.44	<0.47	<0.43	<0.42	<0.53	<0.45	<0.43	<0.46	<0.50	<0.41	<0.44
Tributyltin	ug/kg			1400	<0.42	140	<0.63	<0.52	<0.43	140	7.6	<0.42	65	<0.42	<0.55	<0.55	<0.43	110	30	<0.53	<0.53	64	<0.60	<0.55	<0.41	11	<0.40	<0.39	76	10	<0.40	<0.43	42	<0.38	<0.41
SQO Chemistry Line of Evidence Mean Score																																		
SQO LOE				3	1	4	4	4	1	4	2	1	4	4	4	4	2	4	4	4	4	4	4	4	1	4	2	1	4	3	2	2	3	1	1
ERMqs																																		
Pesticides ERMq				0.22	0.05	5.03	21.48	3.43	0.05	3.74	0.68	0.05	1.86	2.02	0.12	0.07	0.05	1.45	3.31	7.34	0.06	3.02	0.33	0.07	0.05	0.99	0.06	0.05	1.16	1.31	0.05	0.05	1.15	0.05	0.05
PCB ERMq				0.37	0.28	3.33	27.73	7.03	0.28	1.39	0.45	0.28	2.51	1.05	0.36	0.36	0.28	2.07	7.60	5.44	5.93	2.11	1.08	0.90	0.27	0.76	0.27	0.26	1.92	1.01	0.26	0.28	0.80	0.25	0.27
PAHs ERMq				0.06	0.00	0.34	1.70	5.24	0.07	0.27	0.03	0.00	0.13	0.63	0.77	17.37	0.44	0.14	1.00	2.17	1.24	0.28	0.91	0.24	0.00	0.28	0.14	0.00	0.33	0.08	0.00	0.00	0.66	0.00	0.00
Metals ERMq				0.46	0.04	1.01	7.06	14.59	0.09	0.70	0.13	0.03	3.10	2.31	4.76	4.93	0.14	0.63	6.99	10.18	9.12	0.72	3.83	2.54	0.03	0.57	0.10	0.03	0.91	0.46	0.09	0.10	0.18	0.03	0.03
Overall Mean ERMq				0.27	0.09	2.43	14.49	7.57	0.12	1.53	0.32	0.09	1.90	1.50	1.50	5.68	0.23	1.07	4.72	6.28	4.09	1.53	1.54	0.94	0.09	0.65	0.14	0.09	1.08	0.71	0.10	0.11	0.70	0.08	0.09

Table 7. Summary of Physical Measurements and Chemistry Analytical Results at Berths 240X, Y, and Z Project Area, Port of Los Angeles with a Comparison to Sediment Quality Values (continued)

Analyte	Units	ERL	ERM	Phase I SWM82 0-2 ft	Phase II SWM82 2-3 ft	Phase I SWM82 4-6 ft	Phase I SWM83 0-2 ft	Phase II SWM83 2-4 ft	Phase I SWM84 0-2 ft	Phase I SWM84 4-6 ft	Phase I SWM85 0-2 ft	Phase II SWM85 2-4 ft	Phase I SWM85 4-6 ft	Phase I SWM86 0-2 ft	Phase II SWM86 2-4 ft	Phase I SWM86 4-6 ft	Phase I SWM87 0-2 ft	Phase I SWM87 4-6 ft	Phase I SWM88 0-1 ft	Phase I SWM89 0-1.5 ft	Phase I SWM90 0-1.3 ft
Grain Size																					
Gravel	%			1.5	1.9	0.5	2.5	0.3	0.1	0.9	5.9	4.0	1.7	2.2	2.1	0.0	0.4	0.8	7.8	2.4	5.0
Sand	%			67.3	89.6	98.4	84.2	96.0	64.3	97.1	83.7	85.1	97.6	66.0	92.6	97.2	91.4	97.7	74.3	47.6	22.2
Silt	%			17.1	4.4	0.5	7.3	1.8	21.7	1.2	5.7	6.8	0.5	19.6	2.7	1.7	4.0	0.5	8.4	22.4	33.0
Clay	%			14.1	4.1	0.6	6.1	1.9	14.0	0.9	4.6	4.1	0.1	12.2	2.6	1.1	4.2	1.0	9.5	27.6	39.7
General Chemistry																					
Carbon, Total Organic	%			1.2	0.33	0.073	0.78	0.21	0.99	<0.014	0.59	0.36	0.037J	1.1	0.2	<0.015	0.37	0.07	1.3	2.3	3
Solids, Total	%			70.2	76.3	82.6	76	74.5	66.8	83.8	80.3	85	80.7	74.6	90.2	79.4	82.1	85.5	72.5	54.5	47.1
Trace Metals																					
Arsenic	mg/kg	8.2	70	24.7	3.16	0.978	6.94	3.41	8.55B	1.25B	7.91B	4.9	0.731B	9.57B	1.49	1.61B	4.12B	2.62B	9.1	14.4	17.9
Cadmium	mg/kg	1.2	9.6	1.45	0.255B	0.0474J	0.67	0.228B	0.588	0.0295J	0.592	0.365B	0.0399J	1.07	0.168B	0.0799J	0.226	0.0498J	0.856	0.869	2.22
Chromium	mg/kg	81	370	88	32.7	5.65	61.9	9.8	32.7	6.67	73.5	20.4	7.29	33.7	9.9	10.9	14	6.48	194	102	78.9
Copper	mg/kg	34	270	351	43	3.59	98.6	6.1	59	16	112	113	6.74	79.1	9.27	8.26	32.3	4.52	266	229	280
Lead	mg/kg	46.7	218	199	29.4	1.36	105	4.92	35.9	1.79	312	224	11.2	200	5.77	2.28	55.6	2.65	205	131	2490
Mercury	mg/kg	0.15	0.71	1.18	0.258	<0.0157	5.85	0.03	0.78	<0.0155	1.23	0.945	0.0447	0.878	0.0628	<0.0164	0.148	0.0922	1.05	1.82	2.3
Nickel	mg/kg	20.9	51.6	21	9.39	4.13	15.6	6.91	17.9	5.66	20.6	13.6	4.36	20.1	7.4	8.79	8.13	5.01	28.5	28.1	33.5
Selenium	mg/kg			0.397	0.154	0.0568J	0.234	0.172	0.695	<0.0412	<0.0430	<0.0406	<0.0427	0.804	0.136	0.0785J	0.186	0.0618J	0.528	3.03	1.35
Silver	mg/kg	1	3.7	0.695	0.107J	0.0117J	0.19	0.0324J	0.302	0.00529J	0.148	0.104J	<0.00438	0.31	0.042J	0.0128J	0.0762J	<0.00413	0.353	0.546	0.692
Zinc	mg/kg	150	410	991	116	17.6	359	92.5	123B	24B	654B	547	33.7B	294B	70.8	32.7B	99.7B	18.5B	561	688	792
Polynuclear Aromatic Hydrocarbons																					
1,6,7-Trimethylnaphthalene	ug/kg			<12	<2.2	<2.0	<11	<2.2	4.9J	<2.0	<10	<9.8	<2.1	<22	<1.8	<2.1	<2.0	<1.9	<23	<30	<35
1-Methylnaphthalene	ug/kg			<15	<2.7	<2.5	<14	<2.8	5.2J	<2.5	58J	<12	<2.6	<28	<2.3	<2.6	<2.5	<2.4	<29	<38	<44
1-Methylphenanthrene	ug/kg			<16	<2.9	<2.7	<14	<3.0	<3.3	<2.6	<14	<13	<2.7	<30	<2.4	<2.8	<2.7	<2.6	<30	<40	<47
2,6-Dimethylnaphthalene	ug/kg			27J	8.3J	<2.1	<11	<2.3	25	<2.0	46J	<10	<2.1	42J	<1.9	<2.1	3.3J	<2.0	60J	140J	120J
2-Methylnaphthalene	ug/kg	70	670	<13	3J	<2.2	<12	<2.5	8.3J	<2.2	70	<11	<2.3	<25	<2.0	<2.3	<2.2	<2.2	41J	<34	<39
Acenaphthene	ug/kg	16	500	250	3.7J	<1.8	33J	<2.0	4.6J	<1.8	150	44J	<1.9	<20	<1.7	<1.9	<1.8	<1.8	<21	<28	52J
Acenaphthylene	ug/kg	44	640	270	15	<1.8	46J	<1.9	34	<1.7	39J	60	<1.8	35J	<1.6	<1.8	8.5J	3J	120J	220	1200
Anthracene	ug/kg	85.3	1100	130	29	<1.6	110	5J	51	<1.6	290	120	<1.6	91J	3.2J	<1.7	12	5.4J	400	390	2100
Benzo (a) Anthracene	ug/kg	261	1600	170	38	<2.4	190	31	67	8.9J	520	330	7J	770	8.4J	<2.5	23	11J	1100	480	3000
Benzo (a) Pyrene	ug/kg	430	1600	620	150	<1.5	560	51	270	6.3J	700	680	13	2300	14	<1.6	62	30	1100	1700	5900
Benzo (b) Fluoranthene	ug/kg			770	170	<1.9	560	34	310	4.7J	650	490	11J	1800	14	<1.9	77	41	1800	2600	7600
Benzo (e) Pyrene	ug/kg			320	83	<2.8	290	23	130	2.8J	360	340	6.5J	1300	8J	<2.9	32	19	890	1300	3900
Benzo (g,h,i) Perylene	ug/kg			330	66	<1.6	260	26	140	4.4J	210	390	6.6J	980	8.2J	<1.6	33	15	490	850	2100
Benzo (k) Fluoranthene	ug/kg			460	140	<2.3	440	35	260	5.9J	650	490	9.1J	1900	11J	<2.4	58	19	1300	1300	5100
Biphenyl	ug/kg			<11	<2.1	<1.9	<10	<2.1	<2.4	<1.9	23J	<9.3	<2.0	<21	<1.8	<2.0	<1.9	<1.8	<22	<29	<34
Chrysene	ug/kg	384	2800	280	65	<1.8	230	34	100	7.4J	550	360	5.1J	910	9.1J	<1.9	25	15	1800	860	5000
Dibenz (a,h) Anthracene	ug/kg	63.4	260	85	23	<1.3	78	6.7J	46	<1.3	78	81	<1.3	340	2.3J	<1.3	7.4J	3.4J	180	260	750
Fluoranthene	ug/kg	600	5100	220	49	<1.9	280	41	63	6.8J	1100	610	4.2J	410	7.4J	<2.0	27	9.9J	1400	470	3000
Fluorene	ug/kg	19	540	490	<1.8	<1.7	56J	<1.9	8.9J	<1.7	130	47J	<1.7	29J	<1.5	<1.8	<1.7	<1.6	52J	48J	190J
Indeno (1,2,3-c,d) Pyrene	ug/kg			280	80	<1.6	250	27	130	3.7J	210	350	5.3J	910	7.6J	<1.7	28	14	480	750	2100
Naphthalene	ug/kg	160	2100	52J	9.7J	<2.0	32J	<2.2	8.5J	<2.0	260	62	<2.0	42J	2.3J	<2.1	2.7J	<1.9	37J	54J	64J
Perylene	ug/kg			170	3.2J	<2.3	77	8.8J	110	<2.3	140	140	<2.4	650	5.8J	<2.4	18	7J	340	370	1300
Phenanthrene	ug/kg	240	1500	160	34	<2.6	280	13J	37	<2.6	880	290	<2.7	120J	6.2J	<2.7	19	4.7J	420	270	500
Pyrene	ug/kg	665	2600	1600	55	<2.0	310	65	76	10J	1400	1100	12J	1400	16	<2.1	32	18	1800	720	4700
Total Detectable PAHs	ug/kg	4022	44792	6684	1024.9	<1.3	4082	400.5	1889.4	60.9	8514	5984	79.8	14029	123.5	<1.3	467.9	215.4	13810	12782	48676
Chlorinated Pesticides																					
2,4'-DDD	ug/kg			<0.29	<0.26	<0.24	<0.26	<0.27	0.7J	<0.24	<0.25	<0.24	<0.25	<0.27	<0.22	<0.25	<0.24	<0.23	<0.28	<0.37	9
2,4'-DDE	ug/kg			19	5.8	<0.22	11	0.35J	11	<0.21	<0.22	1.4	<0.22	20	0.51J	<0.22	5.7	<0.21	25	<0.33	<0.38
2,4'-DDT	ug/kg			<0.20	<0.18	<0.17	<0.18	<0.19	<0.21	<0.17	<0.17	<0.16	<0.17	<0.19	<0.16	<0.18	<0.17	<0.16	<0.19	<0.26	<0.30
4,4'-DDD	ug/kg	2	20	4.4	0.54J	<0.31	2.6	<0.35	2.2	<0.31	2.4	0.42J	<0.32	2.8	<0.29	<0.32	0.47J	<0.30	4.6	11	22
4,4'-DDE	ug/kg	2.2	27	84	25	<0.36	28	0.45J	33	<0.36	39	4.2	<0.37	70	1.5	<0.38	14	<0.35	100	100	110
4,4'-DDT	ug/kg	1	7	<0.47	<0.43	<0.40	<0.43	<0.44	<0.49	<0.39	<0.41	<0.39	<0.41	1.5	<0.36	<0.41	<0.40	<0.38	<0.45	<0.60	<0.70
Aldrin	ug/kg			<0.44	<0.41	<0.37	<0.41	<0.41	<0.46	<0.37	<0.38	<0.36	<0.38	<0.41	<0.34	<0.39	<0.38	<0.36	<0.43	<0.57	<0.66
Alpha Chlordane	ug/kg			<0.37	<0.34	<0.31	<0.34	<0.35	<0.39	<0.31	<0.32	<0.30	<0.32	<0.35	<0.29	<0.32	<0.31	<0.30	<0.36	<0.47	<0.55
Alpha-BHC	ug/kg			<0.42	<0.39	<0.36	<0.39	<0.39	<0.44	<0.35	<0.37	<0.35	<0.36	<0.39	<0.33	<0.37	<0.36	<0.34	<0.41	<0.54	<0.62
Beta-BHC	ug/kg			<0.36	<0.33	<0.31	<0.34	<0.34	<0.38	<0.30	<0.32	<0.30	<0.32	<0.34	<0.28	<0.32	<0.31	<0.30	<0.35	<0.47	<0.54
Chlordane	ug/kg			<5.7	<5.3	<4.9	<5.3	<5.4	<6.0	<4.8	<5.0	<4.7	<5.0	<5.4	<4.4	<5.0	<4.9	<4.7	<5.5	<7.4	<8.5
Cis-nonachlor	ug/kg			<0.77	<0.71	<0.65	<0.71	<0.72	<0.81	<0.64	<0.67	<0.63	<0.67	<0.72	<0.60	<0.68	<0.66	<0.63	<0.74	<0.99	<1.1
Delta-BHC	ug/kg			<0.45	<0.42	<0.39	<0.42	<0.43	<0.48	<0.38	<0.40	<0.37	<0.39	<0.43	<0.35	<0.40	<0.39	<0.37	<0.44	<0.58	<0.68
Dieldrin	ug/kg	0.02	8	<0.32	0.86J	<0.27	<0.30	<0.30	0.91J	<0.27	10	0.68J	<0.28	1.6	<0.25	<0.29	1.2J	0.44J	14	<0.42	<0.48
Endosulfan I	ug/kg			<0.51	<0.47	<0.43	<0.47	<0.48	<0.53	<0.42	<0.44	<0.42	<0.44	<0.48	<0.39	<0.45	<0.43	<0.42	<0.49	<0.65	<0.76
Endosulfan II	ug/kg			<0.25	<0.23	<0.21	<0.23	<0.24	<0.26	<0.21	<0.22	<0.21	<0.22	<0.24	<0.19	<0.22	<0.21	<0.21	<0.24	<0.32	<0.37
Endosulfan Sulfate	ug/kg			<0.37	<0.34	<0.32	<0.35	<0.35	<0.39	<0.31	<0.33	<0.31	<0.33	<0.35	<0.29	<0.33	<0.32	<0.31	<0.36	<0.48	<0.56
Endrin	ug/kg			<0.29	<0.26	<0.24	<0.27	<0.27	<0.30	<0.24	<0.25	<0.24	<0.25	<0.27	<0.22	<0.25	<0.25	<0.24	<0.28	<0.37	<0.43
Endrin Aldehyde	ug/kg			<0.28	<0.26	<0.24	<0.26	<0.26	<0.29	<0.23	<0.24	<0.23	<0.24	<0.26	<0.22	<0.25	<0.24	<0.23	<0.27	<0.36	<0.41
Endrin Ketone	ug/kg			<0.43	<0.39	<0.36	<0.40	<0.40	<0.45	<0.36	<0.37	<0.35	<0.37	<0.40	<0.33	<0.38	<0.37	<0.35	<0.41	<0.55	<0.64
Gamma Chlordane	ug/kg			<0.37	<0.34	<0.31	<0.34	<0.35	<0.39	<0.31	<0.32	<0.30	<0.32	<0.35	<0.29	<0.32	<0.31	<0.30	<0.36	<0.47	<0.55
Gamma-BHC	ug/kg			<0.33	<0.30	<0.28	<0.30	<0.31	<0.34	<0.27	<0.28	<0.27	<0.28	<0.31	<0.25	<0.29	<0.28	<0.27	0.44J	28	4.8
Heptachlor	ug/kg			<0.32	<0.29	<0.27	<0.29	<0.30	<0.33	<0.27	<0.28	<0.26	<0.28	<0.30	<0.25	<0.28	<0.27	<0.26	0.75J	<0.41	<0.47
Heptachlor Epoxide	ug/kg			<0.26	<0.24	<0.22	<0.24	<0.25	<0.28	<0.22	<0.23	<0.22	<0.23	<0.25	<0.20	<0.23	<0.22	0.3J	<0.25	<0.34	<0.39
Methoxychlor	ug/kg			<0.24	<0.22	<0.20	<0.22	<0.22	<0.25	<0.20	<0.21	<0.20	<0.21	<0.22	<0.19	<0.21	<0.20	<0.20	<0.23	<0.31	<0.36
Total Detectable Chlordane (a,g)	ug/kg	0.5	6	<0.37	<0.34	<0.31	<0.34	<0.35	<0.39	<0.31	<0.32	<0.3	<0.32	<0.35	<0.29	<0.32	<0.31	<0.3	<0.36	<0.47	<0.55
Total Detectable DDTs	ug/kg	1.58	46.1	107.4	31.34	<0.17	41.6	0.8	46.9	<0.17	41.4	6.02	<0.17	94.3	2.01	<0.18	20.17	<0.16	129.6	111	141
Toxaphene	ug/kg			<12	<11	<10	<11	<11	<13	<10	<11	<10	<10	<11	<9.4	<11	<10	<9.9	<12	<16	<18
Trans-nonachlor	ug/kg			<0.78	<0.72	<0.66	<0.72	<0.74	<0.82	<0.66	<0.68	<0.65	<0.68	<0.74	<0.61	<0.69	<0.67	<0.64	<0.76	2.7	<1.2

Table 7. Summary of Physical Measurements and Chemistry Analytical Results at Berths 240X, Y, and Z Project Area, Port of Los Angeles with a Comparison to Sediment Quality Values (continued)

Analyte	Units	ERL	ERM	Phase I SWM 82 0-2 ft	Phase II SWM82 2-3 ft	Phase I SWM 82 4-6 ft	Phase I SWM 83 0-2 ft	Phase II SWM83 2-4 ft	Phase I SWM 84 0-2 ft	Phase I SWM 84 4-6 ft	Phase I SWM 85 0-2 ft	Phase II SWM85 2-4 ft	Phase I SWM 85 4-6 ft	Phase I SWM 86 0-2 ft	Phase II SWM86 2-4 ft	Phase I SWM 86 4-6 ft	Phase I SWM 87 0-2 ft	Phase I SWM 87 4-6 ft	Phase I SWM 88 0-1 ft	Phase I SWM 89 0-1.5 ft	Phase I SWM 90 0-1.3 ft
PCB Congeners																					
PCB008	ug/kg			<2.6	<2.4	<2.2	<2.4	<2.4	<2.7	<2.1	<2.2	<2.1	<2.2	<2.4	<2.0	<2.3	<2.2	<2.1	<2.5	170	43
PCB018	ug/kg			2.6J	4J	<2.1	6.3J	<2.3	<2.6	<2.1	7.7	<2.1	<2.2	<2.3	<1.9	<2.2	<2.1	<2.0	8.2	560	210
PCB028	ug/kg			2.5J	<2.3	<2.1	3J	<2.3	<2.6	<2.1	2.2J	<2.0	<2.2	<2.3	<1.9	<2.2	<2.1	<2.0	3.9J	280	57
PCB037	ug/kg			<2.5	<2.3	<2.2	<2.3	<2.4	<2.7	<2.1	<2.2	<2.1	<2.2	<2.4	<2.0	<2.2	<2.2	<2.1	<2.5	76	18
PCB044	ug/kg			15	4.5J	<2.1	11	<2.4	4.5J	<2.1	18	4.1J	<2.2	4J	<2.0	<2.2	2.2J	<2.1	16	160	47
PCB049	ug/kg			6.7J	6.4J	<2.1	5.2J	<2.3	3.7J	<2.1	16	8.1	<2.1	3.3J	<1.9	<2.2	<2.1	<2.0	7.9	140	34
PCB052	ug/kg			31	5.6J	<2.5	23	2.9J	8.7	<2.4	51	8.2	<2.5	9.5	<2.3	<2.6	5.2J	<2.4	39	210	71
PCB066	ug/kg			9.1	3.9J	<2.1	6.6	<2.3	3.9J	<2.1	13	<2.0	<2.2	<2.3	<1.9	<2.2	<2.1	<2.0	9.3	190	45
PCB070	ug/kg			19	4.3J	<2.3	13	<2.5	3.7J	<2.2	28	4.4J	<2.3	3J	<2.1	<2.3	2.7J	<2.2	20	210	46
PCB074	ug/kg			5.1J	<2.3	<2.1	3.5J	<2.4	<2.6	<2.1	6J	<2.1	<2.2	<2.4	<2.0	<2.2	<2.2	<2.1	5.4J	100	21
PCB077	ug/kg			3.5J	<2.3	<2.1	2.7J	<2.3	<2.6	<2.1	3.7J	<2.1	<2.2	<2.3	<1.9	<2.2	<2.1	<2.0	3.4J	20	8.7J
PCB081	ug/kg			<2.5	<2.3	<2.2	<2.3	<2.4	<2.7	<2.1	<2.2	<2.1	<2.2	<2.4	<2.0	<2.2	<2.2	<2.1	<2.5	<3.3	<3.8
PCB087	ug/kg			27	2.8J	<2.2	21	<2.4	8.7	<2.1	40	6.2	<2.2	7.5	<2.0	<2.3	3.4J	<2.1	31	57	40
PCB099	ug/kg			18	2.9J	<2.1	11	<2.4	3.6J	<2.1	38	4.2J	<2.2	<2.4	<2.0	<2.2	3J	<2.1	21	46	19
PCB101	ug/kg			57	8	<2.3	39	4.5J	10	<2.2	99	14	<2.3	6.3J	<2.1	<2.3	7.6	<2.2	70	110	49
PCB105	ug/kg			19	3.6J	<2.3	14	<2.6	5.2J	<2.3	27	6.9	<2.4	3.8J	<2.1	<2.4	<2.4	<2.3	21	50	23
PCB110	ug/kg			51	7.3	<2.0	35	3.9J	11	<2.0	90	13	<2.1	6.3J	<1.8	<2.1	7.2	<1.9	64	92	54
PCB114	ug/kg			<2.4	<2.2	<2.0	<2.2	<2.3	<2.5	<2.0	<2.1	<2.0	<2.1	<2.3	<1.9	<2.1	<2.1	<2.0	<2.3	3.5J	<3.6
PCB118	ug/kg			42	6.3J	<2.2	28	3.7J	8.6	<2.1	74	9.8	<2.2	5J	<2.0	<2.3	5.3J	<2.1	52	90	44
PCB119	ug/kg			<2.5	<2.3	<2.1	<2.3	<2.3	<2.6	<2.1	2.4J	<2.0	<2.1	<2.3	<1.9	<2.2	<2.1	<2.0	<2.4	3.3J	<3.7
PCB123	ug/kg			2.6J	<2.2	<2.0	<2.2	<2.2	<2.5	<2.0	6.8	<2.0	<2.1	<2.2	<1.8	<2.1	<2.0	<1.9	2.8J	6.1J	<3.5
PCB126	ug/kg			2.5J	<2.1	<2.0	3.2J	<2.2	3.5J	<2.0	<2.0	<1.9	<2.0	3.4J	<1.8	<2.1	<2.0	<1.9	<2.3	5.5J	<3.5
PCB128	ug/kg			11	<2.2	<2.0	7.8	<2.2	<2.5	<2.0	19	3.6J	<2.0	<2.2	<1.8	<2.1	<2.0	<1.9	13	14	<3.5
PCB138/158	ug/kg			51	8.3	<4.2	51	<4.7	14	<4.2	91	13	<4.3	6.9	<3.9	<4.4	6.5	<4.1	70	70	56
PCB149	ug/kg			28	4.9J	<2.0	28	2.5J	7J	<2.0	49	7.9	<2.1	3.5J	<1.9	<2.1	3.3J	<2.0	39	34	31
PCB151	ug/kg			8.4	<2.2	<2.1	9.6	<2.3	4.6J	<2.0	12	2J	<2.1	3.5J	<1.9	<2.1	<2.1	<2.0	11	12	14
PCB153	ug/kg			45	7.9	<2.0	44	4.2J	11	<2.0	76	11	<2.1	5.1J	<1.8	<2.1	5.1J	<1.9	62	63	51
PCB156	ug/kg			5.9J	<2.5	<2.3	5.1J	<2.6	<2.9	<2.3	11	2.9J	<2.4	<2.6	<2.1	<2.4	<2.3	<2.2	7.4	7.9J	6.5J
PCB157	ug/kg			2.6J	3.2J	<2.2	4.4J	<2.4	3.7J	<2.1	3.9J	2.5J	<2.2	2.7J	<2.0	<2.3	<2.2	<2.1	2.7J	6.7J	9J
PCB167	ug/kg			<2.5	<2.3	<2.1	<2.3	<2.3	<2.6	<2.1	2.7J	<2.0	<2.1	<2.3	<1.9	<2.2	<2.1	<2.0	<2.4	<3.2	<3.7
PCB168	ug/kg			<2.3	<2.1	<1.9	<2.1	<2.1	<2.4	<1.9	<2.0	<1.9	<2.0	<2.1	<1.8	<2.0	<1.9	<1.9	<2.2	<2.9	<3.4
PCB169	ug/kg			<2.2	<2.0	<1.9	<2.0	<2.1	<2.3	<1.9	<1.9	<1.8	<1.9	<2.1	<1.7	<2.0	<1.9	<1.8	<2.1	<2.8	<3.3
PCB170	ug/kg			11	2.1J	<1.8	13	<2.0	2.5J	<1.7	9.6	3.3J	<1.8	<2.0	<1.6	<1.8	<1.8	<1.7	16	13	<3.1
PCB177	ug/kg			3J	<2.3	<2.1	5.2J	<2.3	<2.6	<2.1	3.5J	<2.0	<2.1	<2.3	<1.9	<2.2	<2.1	<2.0	4.4J	4.1J	4.7J
PCB180	ug/kg			13	3.3J	<2.1	24	<2.3	5.2J	<2.1	15	3.2J	<2.2	3.4J	<1.9	<2.2	<2.1	<2.0	19	19	20
PCB183	ug/kg			3.6J	<2.2	<2.1	5.2J	<2.3	<2.5	<2.0	3.8J	<2.0	<2.1	<2.3	<1.9	<2.1	<2.1	<2.0	5.1J	5J	4.9J
PCB184	ug/kg			<2.4	<2.2	<2.1	<2.2	<2.3	<2.5	<2.0	<2.1	<2.0	<2.1	<2.3	<1.9	<2.1	<2.1	<2.0	<2.3	<3.1	<3.6
PCB187	ug/kg			6.4J	<2.3	<2.1	9.9	<2.3	3.4J	<2.1	7	<2.0	<2.1	<2.3	<1.9	<2.2	<2.1	<2.0	11	11	11
PCB189	ug/kg			<2.4	<2.2	<2.0	<2.2	<2.2	<2.5	<2.0	<2.1	<2.0	<2.1	<2.2	<1.8	<2.1	<2.0	<1.9	<2.3	<3.1	<3.5
PCB194	ug/kg			3.9J	<1.8	<1.7	4.4J	<1.8	<2.0	<1.6	3.4J	<1.6	<1.7	<1.8	<1.5	<1.7	<1.7	<1.6	5.7J	5.5J	<2.9
PCB195	ug/kg			<2.2	<2.1	<1.9	<2.1	<2.1	<2.4	<1.9	<2.0	<1.8	<1.9	<2.1	<1.7	<2.0	<1.9	<1.8	<2.2	<2.9	<3.3
PCB201	ug/kg			<4.7	<4.3	<4.0	<4.3	<4.4	<4.9	<3.9	<4.1	<3.9	<4.1	<4.4	<3.6	<4.1	<4.0	<3.8	5.7J	<6.0	<7.0
PCB206	ug/kg			<2.7	<2.4	<2.3	3.2J	<2.5	<2.8	<2.2	2.9J	<2.2	<2.3	<2.5	<2.1	<2.3	<2.3	<2.2	3.8J	5.2J	<4.0
PCB209	ug/kg			<2.5	<2.3	<2.1	<2.3	<2.4	<2.6	<2.1	<2.2	<2.1	<2.2	<2.3	<1.9	<2.2	<2.1	<2.0	<2.4	<3.2	<3.7
Total PCBs	ug/kg	22.7	180	506.4	89.3	<1.7	440.3	21.7	126.5	<1.6	832.6	128.3	<1.7	77.2	<1.5	<1.7	51.5	<1.6	650.7	2849.8	1037.8
Organotins																					
Dibutyltin	ug/kg			59	12	<0.73	<0.79	<0.81	32	<0.72	<0.75	<0.71	<0.74	10	<0.66	<0.76	12	<0.70	32	93	110
Monobutyltin	ug/kg			4.6	<1.3	<1.2	<1.3	<1.3	<1.5	<1.2	<1.2	<1.1	<1.2	<1.3	<1.1	<1.2	<1.2	<1.1	<1.3	<1.8	6.3J
Tetrabutyltin	ug/kg			<0.51	<0.47	<0.43	<0.47	<0.48	<0.54	<0.43	<0.45	<0.42	<0.44	<0.48	<0.40	<0.45	<0.44	<0.42	<0.49	<0.66	<0.76
Tributyltin	ug/kg			54	9	<0.40	7.8	<0.45	35	<0.40	22	<0.39	<0.41	9.8	<0.37	<0.42	27	<0.39	37	130	420
SQO Chemistry Line of Evidence Mean Score																					
SQO LOE				4	2	1	4	2	2	1	4	4	1	4	2	1	2	1	4	4	4
ERMqs																					
Pesticides ERMq				3.37	0.99	0.05	1.20	0.06	1.38	0.05	1.60	0.21	0.05	2.95	0.09	0.05	0.58	0.05	3.97	4.31	5.24
PCB ERMq				2.91	0.66	0.27	2.54	0.38	0.88	0.26	4.70	0.86	0.27	0.61	0.24	0.28	0.48	0.26	3.70	15.92	5.94
PAHs ERMq				0.21	0.03	0.00	0.11	0.01	0.05	0.00	0.27	0.16	0.00	0.34	0.00	0.00	0.01	0.01	0.35	0.31	1.30
Metals ERMq				0.85	0.15	0.02	1.18	0.06	0.28	0.03	0.67	0.51	0.04	0.44	0.06	0.04	0.12	0.04	0.68	0.77	2.13
Overall Mean ERMq				1.84	0.46	0.08	1.26	0.13	0.64	0.09	1.81	0.43	0.09	1.09	0.10	0.09	0.30	0.09	2.18	5.33	3.65

All values in dry weight except where noted.
Blue: The measured concentration exceeds the analyte's respective ER-L value.
Yellow: The measured concentration exceeds the analyte's respective ER-M value.

< = Below the method detection limit indicated.
J = Analyte detected at a concentration below the reporting limit and above the method detection limit. Value is estimated.
B = Analyte detected in procedural blank

3.2.2 Potential Landside–Waterside Contamination Nexus

3.2.2.1 Stations Adjacent to Storm Drain Outfalls

Four stations (SWM75, SWM76, SWM77, and SWM83) were located near storm drain outfalls. Only Phase I analysis (depth layers 0–2 ft) was used to assess the potential contamination from the storm drains to sediments at these four stations.

Grain Size and Total Organic Carbon
The majority of samples collected near storm drains (SWM75, SMW76, and SWM83) were composed primarily of sand and silt. Gravel and clay contributed only minimally (0.2–16.7%) to grain size at these stations. SWM77 was also composed primarily of sand and silt, although clay (27.4%) also contributed to grain size at this station. TOC ranged in concentration from 0.78% at SWM83 (0–2 ft) to 2.3% at SWM76 (0–2 ft).

Metals
Metals concentrations in the 0–2 ft depth interval of stations near storm drain outfalls were generally below the ER-M values with a few exceptions. At SWM75, lead exceeded the ER-M value (218 mg/kg) with a concentration of 1,620 mg/kg and mercury exceeded the ER-M value (0.71 mg/kg) with a concentration of 12.2 mg/kg. At SWM76, SWM77, and SWM8, mercury exceeded the ER-M value with concentrations of 1.83 mg/kg, 2.26 mg/kg, and 5.85 mg/kg, respectively.

Organochlorine Pesticides
DDT derivatives and organochlorine pesticide levels at depth interval 0–2 ft of stations near storm drain outfalls were generally below detection limits with a few exceptions. Detection of 2,4'-DDE occurred at all stations with a maximum concentration of 16 µg/kg at SWM77. Detection of 4,4'-DDD occurred at all four stations and dieldrin was detected at one station (SWM77) but the ER-M values (20 µg/kg and 8 µg/kg, respectively) were not exceeded. At stations near storm drain outfalls, 4,4'-DDE was the only analyte which exceeded its ER-M value (27 µg/kg) with a maximum concentration of 73 µg/kg occurring at SWM77. Total DDTs exceeded the ER-M value (46.1 µg/kg) at SWM75 and SMW77, with a maximum concentration of 94.4 µg/kg at station SWM77.

Organotins
TBT was detected at every station near a storm drain outfall at the 0–2-ft depth interval, with concentrations ranging from 7.8–110 µg/kg. TBT exceeded 100 µg/kg only at SWM76. DBT was also detected at all stations except SWM83. DBT concentrations ranged from 49–95 µg/kg. MBT and TTBT were below detection limits at the 0–2-ft depth interval of stations near storm drain outfalls.

Polychlorinated Biphenyls
Several PCB congeners were detected at the 0–2-ft depth interval of stations near storm drains with concentrations ranging from 2.7 µg/kg (estimated due to measurement between detection limit and RL) to 51 µg/kg. Total PCBs at all four stations near storm drains exceeded the ER-M value of 180 µg/kg, with values ranging from 343.4 µg/kg at SWM76 to 440.3 µg/kg at SWM83.

Polycyclic Aromatic Hydrocarbons
Several PAHs were detected at the 0–2-ft depth interval of stations near storm drains. However, only benzo(a)pyrene at SWM77 (1,700 µg/kg) was above the ER-M value of 1,600 µg/kg. Concentrations of total PAHs were below the ER-M value of 44,792 µg/kg at all four stations.

Chemistry Line-of-Evidence Scores
The final mean chemistry LOE score for Phase I analysis conducted at stations located near storm drains was 4 at all four stations. Only Phase I results were necessary for this analysis.

3.2.2.2 Stations under the Wharf

Three stations (SWM88–SWM90) were located under the wharf. Only Phase I (depth layers 0–2 ft) analysis was conducted at these three stations.

Grain Size and Total Organic Carbon
The samples collected under the wharf consisted of very little gravel (2.4–7.8%). SWM89 and SWM90 were composed of a mixture of sand, silt, and clay; whereas SWM88 was primarily sand (74.3%). TOC ranged in concentration from 1.3% at SWM88 to 3.0% at SWM90.

Metals
At two of the three stations (SWM88 and SWM89), metals concentrations were below the ER-M values with the exception of mercury and zinc. At SWM88, mercury exceeded the ER-M value of 0.71 mg/kg with a concentration of 1.05 mg/kg, and zinc exceeded the ER-M value of 410 mg/kg with a concentration of 561 mg/kg. At SWM89, mercury and zinc exceeded their ER-M values with concentrations of 1.82 mg/kg and 688 mg/kg, respectively.

In contrast, ER-M values for copper, lead, mercury, and zinc were all exceeded at SWM90. Copper exceeded the ER-M of 270 mg/kg with a concentration of 280 mg/kg, lead exceeded the ER-M of 218 mg/kg with a concentration of 2,490 mg/kg, mercury exceeded the ER-M with a concentration of 2.3 mg/kg, and zinc exceeded the ER-M with a concentration of 792 mg/kg.

Organochlorine Pesticides
DDT derivatives and organochlorine pesticide levels at stations under the wharf were generally below detection limits with a few exceptions. Detection of 4,4'-DDD occurred at all three stations and exceeded its ER-M of 20 µg/kg at SWM90 with a concentration of 22 µg/kg. At all three stations, 4,4'-DDE exceeded its ER-M of 27 µg/kg with a maximum concentration of 110 µg/kg at SWM90. Dieldrin was detected at SWM88 and exceeded its ER-M of 8 µg/kg with a concentration of 14 µg/kg. Total DDTs exceeded the ER-M of 46.1 µg/kg at all three locations with a maximum concentration of 141 µg/kg at station SWM90.

Organotins
TBT was detected at all three stations under the wharf with concentrations ranging from 37–420 µg/kg. TBT exceeded 100 µg/kg at two of the three stations (SWM89 and SWM90). DBT was also detected at all three stations with concentrations ranging from 32–110 µg/kg. MBT was below detection limits at two of the three stations. At SWM90, MBT was detected but the concentration (6.3 µg/kg) was estimated since the concentration was below the RL. TTBT was below detection limits at all three stations.

Polychlorinated Biphenyls
Several PCB congeners were detected at stations under the wharf, with concentrations ranging from 2.7 µg/kg (estimated since the concentration was below the RL) to 560 µg/kg. Total PCBs at all three stations under the wharf exceeded the ER-M of 180 µg/kg with values ranging from 650.7 µg/kg at SWM88 to 2,849.8 µg/kg at SWM89.

Polycyclic Aromatic Hydrocarbons
Several PAHs were detected at stations under the wharf. There were no ER-M exceedances at SWM88 and there was only one at SWM89, where benzo(a)pyrene (1,700 µg/kg) was above the ER-M value of 1,600 µg/kg. Several PAHs exceeded ER-M values at SWM90, ranging in concentration from 750 µg/kg dibenz(a,h)anthracene to 5,900 µg/kg benzo(a)pyrene. Total PAHs at SWM90 were also above the ER-M of 44,792 µg/kg with a concentration of 48,676 µg/kg.

Chemistry Line-of-Evidence Scores
The final mean chemistry LOE score for stations under the wharf was 4 at all three stations. Only Phase I results were necessary for this analysis.

3.2.2.3 Statistical Evaluation of Landside-Waterside Contamination

Samples used in the evaluation of possible contamination of berth sediments from landside sources were confined to within 100 ft of the storm drain outfalls (Figure 5) to improve on the likelihood of statistically discerning potential contaminant gradients relating to stormwater inputs. A two-sample t-test was conducted that compared the effects range median quotient (ERMq) results for samples collected within 50 ft of each outfall to the results for sample locations between 50-100 ft of each outfall. Overall, surface sediments located within 50 ft of stormwater outfalls within the berth did not have significantly higher concentrations of PCBs, metals, or pesticides when compared to stations located 50—100 ft of the outfall. A Spearman Rank correlation was completed as a secondary analysis correlating ERMq results with distance from each outfall. Results of this evaluation showed that ERMqs were not significantly higher closer to the storm drains for pesticides, PCBs, PAHs, or metals. Metal ERMqs actually increased with distance at the southern outfall (critical value of 0.786 compared to a calculated "r" coefficient of 0.7857). This increase in metal concentration with distance is likely a consequence of higher concentrations in the berth due to other source inputs and sediment mixing due to normal shipyard activities (vessel movement, dry dock operations, etc.). While storm drain outfalls likely contributed some level of contaminants to sediments in the berth, higher contaminant levels arising from other sources combined with mixing and transport of sediments within the berth confounded our ability to differentiate between storm drain outfall contributions and other potential sources of contamination.

Figure 5. Landside Contamination in Relationship to Sediment Quality Objective Line of Evidence and ERMq Scores at Berths 240X, Y, and Z, Port of Los Angeles

3.3 Quality Control Results

The process of QA/QC has two components: 1) QA is a system used to verify that the entire process is operating within acceptable limits and 2) QCs are mechanisms established to measure non-conforming method performance. Generally, analytical results for this project were within corresponding project and/or laboratory QA/QC acceptance ranges and limits. A summary of QA procedures and QC findings, qualifications and exceptions are presented categorically by matrix in Appendix C. QC sample type analyzed per matrix is summarized in Table C-1. A QC summarization of the accuracy of the surrogate results are presented in Table C-2, and the accuracy and precision results of matrix spikes (MS) are presented in Table C-3.

Holding Times
All sediment samples were analyzed within method recommended holding times. Batch 10-06-0675 samples were noted as "received past holding time" in the Sample Receipt Form. However, all samples were frozen by WESTON following collection, and remained in this condition until received by Calscience. In accordance with the project SAP, holding time was extended beyond the USEPA recommended extraction/analysis criteria; therefore, not violating the holding time rules.

Blanks
Laboratory contamination introduced during method use was assessed through the analysis of procedural or method blanks on a minimum frequency of one per batch or matrix type. It was assumed that the procedural blank represented a constant background contamination that affected standards and samples identically and therefore were handled similar to a sample including the addition of the same reagents, contact with the same type of vessels, and processed with the same procedure. All sediment method/procedural blanks analytes were found to be below the indicated RLs, demonstrating no significant contamination associated with the analytical procedures.

Method Reporting Limits
RLs for target analytes measured in these sediment samples were greater than or equal to method detection limits (MDLs) and above instrument detection limits as described by USEPA SW-846 protocol. Detection limits met regulatory screening guidelines.

Accuracy
The chlorinated pesticides surrogate 2,4,5,6-tetrachloro-m-xylene, was out of the established control limits for samples SWM68 (0–2 ft) and SWM75 (4–6 ft). However, results were released with no further clarification since the decachlorobiphenyl recoveries and the method blank surrogate recoveries fell within established control limits.

The chlorinated pesticides surrogate decachlorobiphenyl, was outside the control limits for samples SWM73 (4–6 ft) and SWM67 (0–2 ft). However, data were released with no further action since the 2,4,5,6-tetrachloro-m-xylene recoveries, and the method blank surrogate recoveries fell within established control limits.

The chlorinated pesticides surrogate decachlorobiphenyl, was out of the established control limits for sample SWM89 (0–1.5 ft). However, results were released with no further clarification

since the 2,4,5,6-tetrachloro-m-xylene surrogate recovery and the method blank surrogate recoveries fell within established control limits.

The chlorinated pesticide surrogate 2,4,5,6-tetrachloro-m-xylene, was above the control limits for samples SWM20 (10–12 ft) and SWM76 (8–10 ft) due to matrix interference. Results were released with no further action since the surrogate was confirmed by a second analysis and the method blank surrogates were within established control limits.

One or more of the PAH surrogates fell outside established control limits for samples SWM68 (0–2 ft), SWM71 (4–6 ft), SWM20 (6–8 ft), SWM75 (4–6 ft), SWM78 (0–2 ft), and SWM22 (5–7 ft). However, data were released with no further explanation since a matrix effect was evident, and the method blank surrogate recoveries were within established control limits.

The PAH surrogate recovery for d-terphenyl-d14 fell outside the established control limits for sample SWM82 (0–2 ft). However, data were released with no further action since the remaining two PAH surrogate recoveries, and the method blank surrogate recoveries were within established control limits.

Due to matrix interference and necessary dilutions performed, two of the three PAH surrogates fell outside the established control limits for sample SWM71 (6–7.5 ft), and all three PAH surrogates fell outside the control limits for sample SWM20 (8–10 ft). However, data were released with no further action since the method blank surrogate recoveries were within established control limits.

Tripentlytin, the organotins surrogate, was above the control limits for samples SWM67 (2–3.5 ft) and SWM69 (2–4 ft). Results were released with no further action since surrogates were confirmed by a second analysis, a matrix effect was evident, and the method blank surrogate was within established control limits.

Metals matrix spiking was performed on samples SWM78 (4-6 ft), SWM84 (4-6 ft), and SWM50 (8-10 ft). The MS and matrix spike duplicate (MSD) recoveries for copper (in sample SWM84 4-6 ft) and zinc (in sample SWM78 4-6 ft) fell below the established control limits. However, since the corresponding Laboratory Control Sample (LCS) / Laboratory Control Sample Duplicate (LCSD) recoveries were in control, the data were released with no further action.

Metals matrix spiking was performed on sample SWM64 (12-14 ft). Due to sample concentrations exceeding MS concentrations by four times or more, the MS and/or MSD recoveries for lead, zinc, and mercury were out of the acceptance range. However, since the LCS/LCSD recoveries were in control, the data were released with no further action.

Sample SWM78 (2-4 ft) was used for metals matrix spiking and the MS, MSD, and/or RPD values for copper, lead and zinc were out of the acceptance ranges due to matrix interference. However, since the post digestion spike (PDS)/post digestion spike duplicate (PDSD) and LCS/LCSD recoveries were in control, the data were released with no further action.

Sample SWM49 (12-14 ft) was used for metals matrix spiking and the MS and MSD recoveries for lead and zinc were out of the acceptance ranges due to matrix interference. However, since the PDS/PDSD and LCS/LCSD recoveries were in control, the data were released with no further action.

Chlorinated pesticides MS were performed on sample SWM78 (4-6 ft), and the MS and/or MSD recoveries for dieldrin and endrin aldehyde were outside the established control limits due to matrix interference. However, since the corresponding LCS/LCSD recoveries were in control, the data were released with no further qualification.

Chlorinated pesticides MS were performed on sample SWM62 (12-14 ft), and the MS/MSD recoveries and/or RPD values for six analytes were outside the established control limits. However, since the corresponding LCS/LCSD recoveries and RPDs were in control, the data were released with no further qualification.

Chlorinated pesticides were spiked on sample SWM86 (2-4 ft), and the MS/MSD recoveries and/or RPD values for most of the analytes were outside the established control limits. However, since the corresponding LCS/LCSD recoveries and RPDs were within the established control limits, the data were released with no further qualification.

Chlorinated pesticides were spiked on sample SWM40 (12-14 ft), and the MS/MSD recoveries and/or RPD values for five analytes were outside the established control limits due to matrix interference. However, since the corresponding LCS/LCSD recoveries and RPDs were within the established control limits, the data were released with no further qualification.

PAHs were spiked on sample SWM64 (12-14 ft) and many of the MS and MSD recoveries for the PAH compounds were outside the established control limits due to the high concentrations of PAHs found in the sample. Yet the results were released with no further clarification since the corresponding LCS/LCSD recoveries were in control.

Sample SWM73 (10-11.5 ft) was used for PAH matrix spiking, and the MS, MSD, and/or RPD values for most of the analytes were outside the established control limits. Yet the results were released with no further clarification since the corresponding LCS/LCSD recoveries and RPD values were in control.

Sample SWM64 (12-14 ft) was used for the PCB congener spike and several PCB congener's MS recoveries and/or RPD values were outside the established control limits. However, since the associated LCS/LCSD recoveries and RPDs were in control, the results were released with no further action.

Sample SWM86 (2-4 ft) was used for PCB Congeners matrix spiking, and the MS recovery for PCB Congener 206 fell above the control limits. However, since the associated LCS and LCSD recoveries were in control, the results were released with no further action.

Sample SWM78 (4-6 ft) was used for organotins matrix spiking, and the RPD values for TBT and TTBT were outside the established control limits. Yet the results were released with no further clarification since the corresponding LCS/LCSD RPD values were in control.

Sample SWM86 (2-4 ft) was used for organotins matrix spiking, and the RPD values for TBT and TTBT were outside the established control limits. Yet the results were released with no further clarification since the corresponding LCS/LCSD RPD values were in control.

Precision

One or more target of the samples resulted in MS RPDs that were outside of established control limits due to sediment matrix interference. The associated laboratory control sample spike RPDs were within established control limits, and therefore the sample data were reported without further action.

All other parameters were found to have acceptable RPD values including results of duplicate sample analysis and duplicate blank, matrix, laboratory control sample, post-digestion, and surrogate spikes with the exception of benzo(a)pyrene on the LCS from preparation batch 100508L01 where the RPD of the MS was in control and therefore did not require further action

4.0 DISCUSSION

Mean overall effects range median quotient (ERMq) scores and California Sediment Quality Objective chemical line of evidence (SQO LOE) scores were independently used to screen measured sediment-associated contaminants throughout the Berth 240 Slip (slip) for potential direct effects to benthic biota. Based on the application of these screening level ecological risk assessment tools, elevated contaminated sediment concentrations (e.g., mean ERMq scores >1.0 and SQO LOE values of moderate [category 3] to high [category 4]) were measured in surficial sediments (0-2 ft), throughout the slip. In general the elevated contaminants (i.e., metals, PAHs, PCBs, and pesticides) appear to be concentrated in the northeast quadrant of the slip where they persist at depth. Because of the generally high levels in surficial sediment throughout the slip and the amount of sediment mixing and transport associated with normal operations within the slip (i.e., vessel traffic and operation of dry dock facilities) it was not possible to discern a contaminant gradient linkage to landside source inputs (e.g., storm drain outfalls and existing adjacent landside sources of contamination).

Based on analytical results from this investigation as well as results of the two prior sampling efforts conducted in 2005 and 2007, contaminant concentrations were found to generally diminish with increased sediment depth as well as distance from the northeast corner of the slip. Overall, a decrease in ERMq and SQO LOE scores was observed with increasing sediment depth, particularly in the south end and western portions of the slip where contaminant concentrations rapidly fell off to levels indicative of relatively clean material (ERMq values $\leq$ 1.0; SQO LOE scores $\leq$ 2; [i.e., below levels thought to produce direct effects in benthic biota]) at depths greater than four feet below the mud-line (Figure 6 and Figure 7). Although a trend of decreasing contaminant concentration with increasing sample depth was observed at some locations in the northeast quadrant of the slip as well, no firm conclusions can be drawn about a depth of "clean" sediment in this area of the slip. In general, sediments collected at depths greater than 12-feet below the mud-line in the northeast quadrant of the slip had ERMq scores of less than 1.0. However, at seven sample locations in the northeast quadrant (e.g., stations 20, 22, 66, 71, 70, 75, and 76), a clean sediment layer could not be obtained due to the presence of rocks, cobble, shells, and/or other debris at 4 to 14-ft below mud-line (-38 to -50 MLLW) that prevented sediment recovery at deeper sampling intervals (Figure 8).

Overall mean ERMq scores (i.e., mean of ERMq scores for pesticides, PCBs, PAHs, and metals) were used to spatially identify elevated contaminated sediment concentrations in the northeast quadrant of the slip where they persist at depth but rapidly diminish with increased depth and distance from the northeast quadrant. For surficial sediments (0-2 ft), 22 of 33 stations were identified with mean ERMq scores greater than 1.0 and the remainder between 0.1 and 0.999. Sediments with an ERMq score greater than one were primarily located throughout the northeast quadrant of the slip and/or adjacent to a storm drain outfall, along the wharf wall (Figure 7). As previously identified, a rapid decrease in sediment contamination was measured in the southern and western areas of the slip. Conversely, mean ERMq scores greater than 1.0 were measured only in the northeast quadrant of the slip at depth intervals greater than 4-ft below mud-line and/or in surficial sediments adjacent to a storm drain outfall (0-2 ft) (Figure 7). Three sediment samples were collected in the northeast quadrant of the slip at the 12–14 ft depth interval all with overall mean ERMq scores less than 1.0, potentially indicative of clean sediments.

Relative to overall mean ERMq scores, SQO LOE scores were typically more conservative and clearly highlighted the contaminated zones of the slip. Again, SQO LOE values of moderate (category 3) to high (category 4) are indicative of contaminant concentrations that have the potential to produce direct effects in benthic biota. SQO LOE scores ≤ 2 are indicative of relatively clean material (i.e., below levels thought to produce direct effects in benthic biota). Of the 32 sediment cores collected and analyzed for SQO LOE scores at a depth interval of 0–2 ft (surficial sediments), 30 samples scored a 3 or 4, with 27 sample stations scoring a maximum of 4 (Figure 6). Similar to mean ERMq scores, stations with a SQO LOE score greater than three were primarily located throughout the northeast quadrant of the slip and/or adjacent to a storm drain outfall, along the wharf wall (Figure 6). As per SQO LOE scores, a rapid decrease in sediment contamination was measured in the southern and western portions of the slip. SQO LOE scores > 3 were only measured in the northeast quadrant of the slip at depths greater than 4-ft below mud-line and/or in surficial sediments adjacent to a storm drain outfall (0-2 ft) (Figure 6). More than 50 percent of the sediment samples collected from a 2-4 ft depth interval to a 10-12 ft depth interval had SQO LOE scores greater than 3. One sediment sample was collected at a 14–15 ft depth interval that had a SQO LOE score of 1 (i.e., indicative of sediment with a low potential to produce direct effects in benthic biota).

Overall metals concentrations that may illicit direct effects in benthic biota (as determined by ERMq scores greater than 1.0) were measured in sediment samples collected from the mud-line to a 10–12 ft depth interval. Approximately half of the samples analyzed at a depth interval of 0-2 ft (surficial sediments) had metals ERMq scores between 1.0 and 9.999, whereas the other half had scores between 0.1 and 0.999. Distribution of metals ERMq scores within the slip were comparable to overall mean ERMq scores, with metals-contaminated sediments located in the northeast quadrant and/or adjacent to a storm drain outfall, along the Berths 240X, Y and Z wharf wall (Figure 9). Very few sampling stations had metal-ERMq scores greater than 1.0 at a depth interval of 2-4 ft (3 of 20 samples) and 4-6 ft (14 of 42 samples). However, of the 18 sediment samples measured for metals at the 6-8 ft depth interval, 11 samples had metal ERMq scores greater than 1.0 with 3 of the 11 samples with a score greater than 10 (Figure 9). A few samples in the northeast quadrant had metal ERMq values greater than 1.0 in the 8-10 ft, 10-12 ft, and 12-14 ft depth intervals.

ERMq scores for PAHs were generally less than one throughout the vertical and horizontal profiles of these slip sediments except at the 6–8 ft depth interval for six stations in the center channel of the northern slip (Figure 10). PAH ERMq scores were greater than 1.0 for 6 of 9 stations evaluated at this sampling interval. PAH-contaminated sediments were generally located in the northeast quadrant of the slip and along the Berths 240X, Y and Z wharf wall. A few stations (< 15-percent) had PAH ERMq scores between 1.0 and 9.999 at each of the other depth intervals (0-2 ft, 2-4 ft, 4-6 ft, 8-10 ft, and 10-12 ft). None of the 3 sediment samples evaluated at a depth interval of 12-14 ft or the one station sample collected at a 14-15 ft depth interval scored a PAH ERMq greater than 1.0, indicating potentially clean sediments 12-ft below the mud-line.

ERMq scores for PCBs were greater than 1.0 in the north half of the slip from the mud-line to the 6–8 ft sediment depth. PCB detections (as determined by ERMq scores greater than 1.0) were equally distributed throughout the northeast quadrant of the slip, from the wharf wall through the center channel (Figure 11). Of the 32 sediment sampling stations evaluated at a depth interval of 0-2 ft (surficial sediments), 21 stations had PCB ERMq scores greater than 1.0. PCB-

contaminated sediments followed a similar trend to overall mean ERMq scores within the slip, PCB ERMq scores greater than 1.0 were located in the northeast quadrant of the slip typically along the eastern Berths 240X, Y and Z wharf wall (Figure 11). PCB concentrations quickly diminished with depth with an ERMq score greater than 1.0 measured in only 3 of 12 stations at the 2-4 ft depth interval and 8 of 21 stations at the 4-6 ft depth interval. In the 6-8 ft, 8-10 ft, and 10-12 ft depth intervals, only a single station had a PCB ERMq score greater than 1.0. None of the 3 sediment samples scored a PCB ERMq greater than one at a 12-14 ft depth interval and the one sediment sample in the northeast portion of the slip at the 14–15-ft depth interval had a PCB ERMq score less than 1.0.

Elevated ERMq scores (greater than 1.0) for pesticides were measured throughout the surficial sediments (0-2 ft) of the slip. Of the 32 sediment sampling stations analyzed for a depth interval of 0-2 ft, greater than half of the sediment samples had ERMq scores greater than 1.0, whereas the other half had scores between 0.1 and 0.999. In addition, scores greater than 1.0 were measured through the vertical profile of several northeast quadrant slip sediment cores to a 6–8 ft sediment depth. Distribution of pesticides was not comparable to overall mean ERMq scores, with pesticide-contaminated sediments equally distributed throughout the slip (Figure 12). Throughout the vertical profile (2-10 ft), a few stations had pesticide ERMq scores greater than 1.0, typically in the northeast quadrant of the slip and/or along the Berths 240X, Y and Z wharf wall. At depths greater than 10-ft below mud-line, none of the sediment samples analyzed for pesticides had an ERMq greater than 1.0.

An evaluation of possible sediment contamination within the slip from landside sources at Berths 240X, Y and Z was conducted using surface samples collected within 100 feet of two storm drain outfalls. ERMq and SQO LOE scores were calculated for nine cores collected adjacent to the storm drain outfalls and under the wharf at a surficial depth (0–2 ft). At seven of these locations overall mean ERMq scores were greater than 1.0 (indicating a potential for direct effects in benthic biota) and all nine samples received a maximum SQO LOE score of 4, also indicative of a potential for direct effects. Overall, a statistically significant decrease in ERMq scores for pesticides, PCBs, PAHs, and metals was not observed for samples collected further from the storm drains. Identifying the extent of contaminant contribution from the Berths 240 X, Y and Z storm drain outfalls is confounded by higher contaminant levels within the slip combined with mixing and transport of sediments due to normal terminal operations. These factors limited our ability to discern a gradient linkage to landside sources. Although surficial sediment and under wharf samples collected and analyzed as a part of this initial reconnaissance study did not provide a concentration gradient associated with these two outfalls, storm drain inputs are an important potential source of historical as well as future contaminant contributions that should undergo further evaluation. Other potential sources of slip contamination include normal terminal activities, groundwater plumes and seeps, open conveyance through the wharf wall and associated rip-rap, sheet-flow run-off from a variety of contaminated landside sourcs, remobilization due to slip traffic, etc.

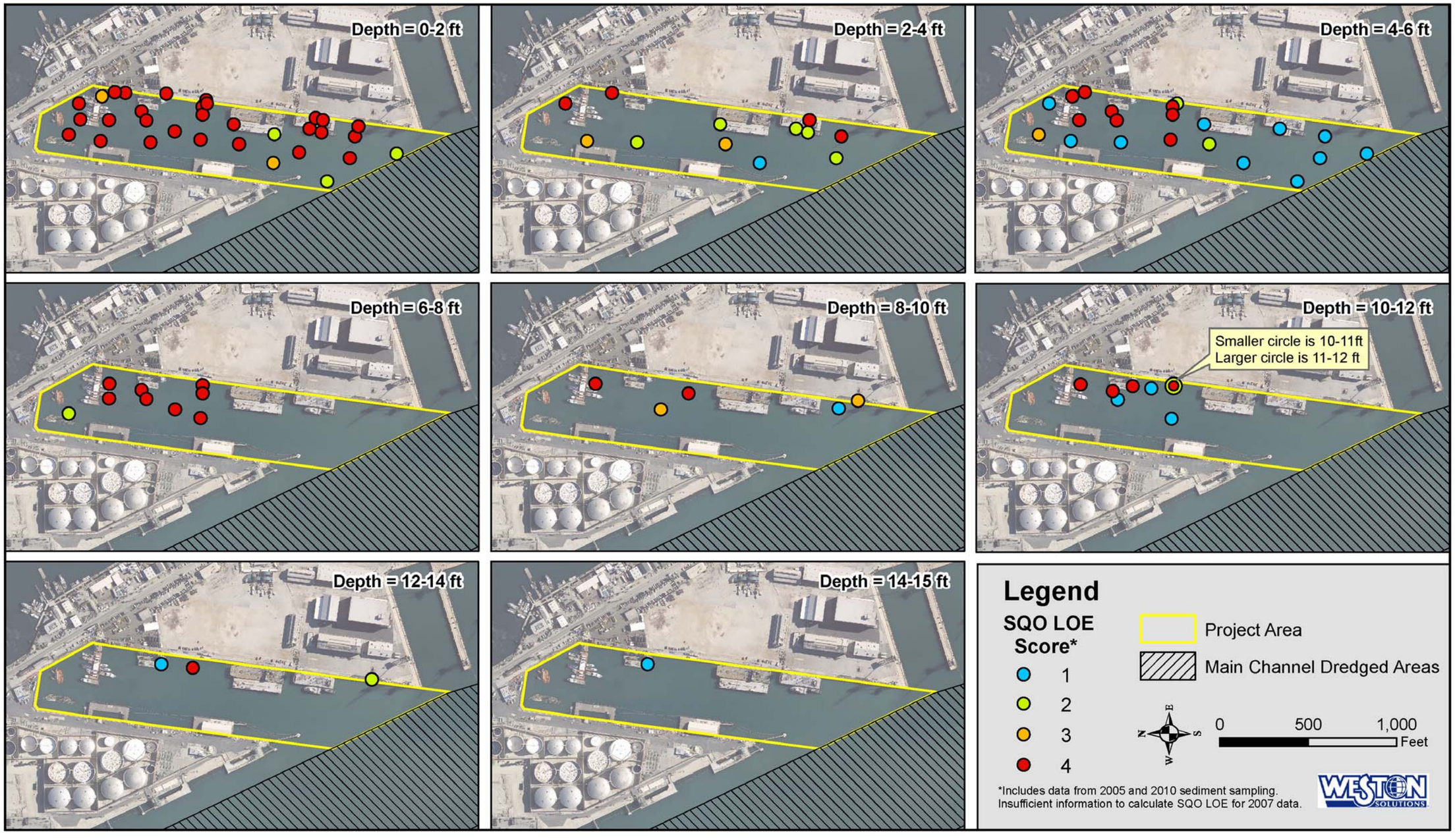

Figure 6. Horizontal and Vertical Distribution of Sediment Quality Objective Line of Evidence Scores at Berths 240X, Y, and Z, Port of Los Angeles

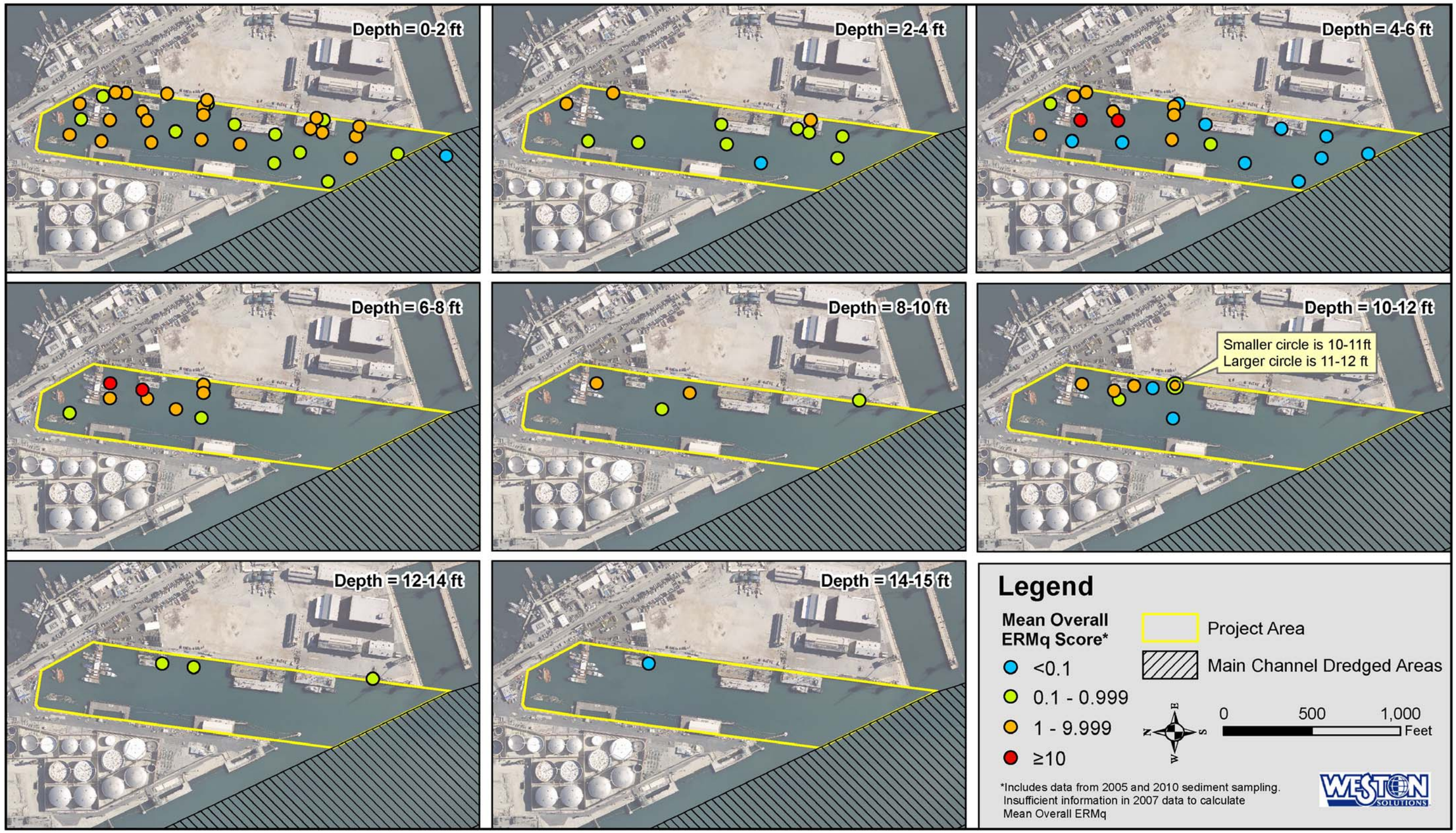

Figure 7. Horizontal and Vertical Distribution of Mean Overall Effects Range Median Quotient Scores at Berths 240X, Y, and Z, Port of Los Angeles

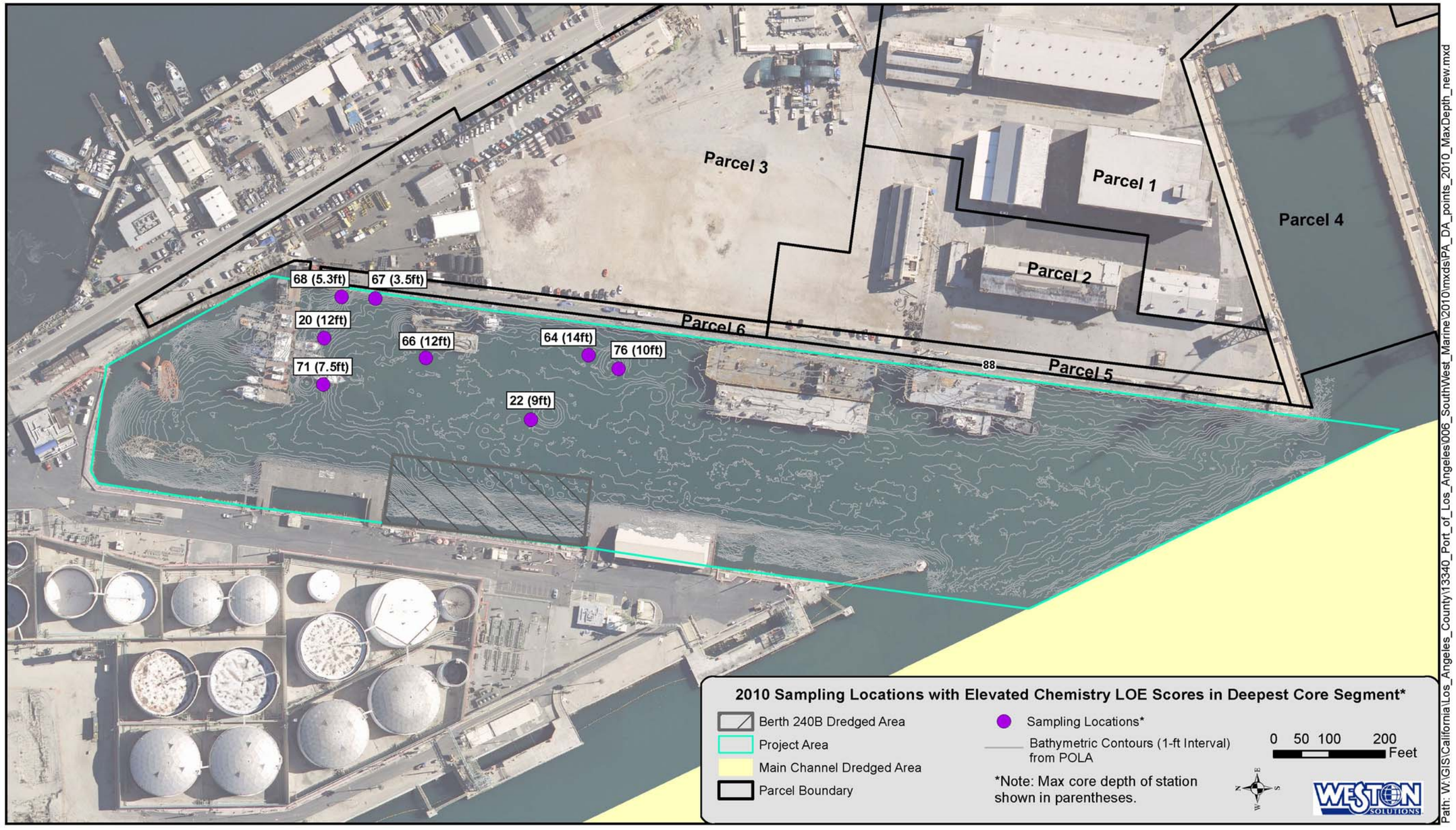

Figure 8. Sampling Locations with Elevated Chemistry Line of Evidence Scores in Deepest Core Segment at Berths 240X, Y, and Z, Port of Los Angeles

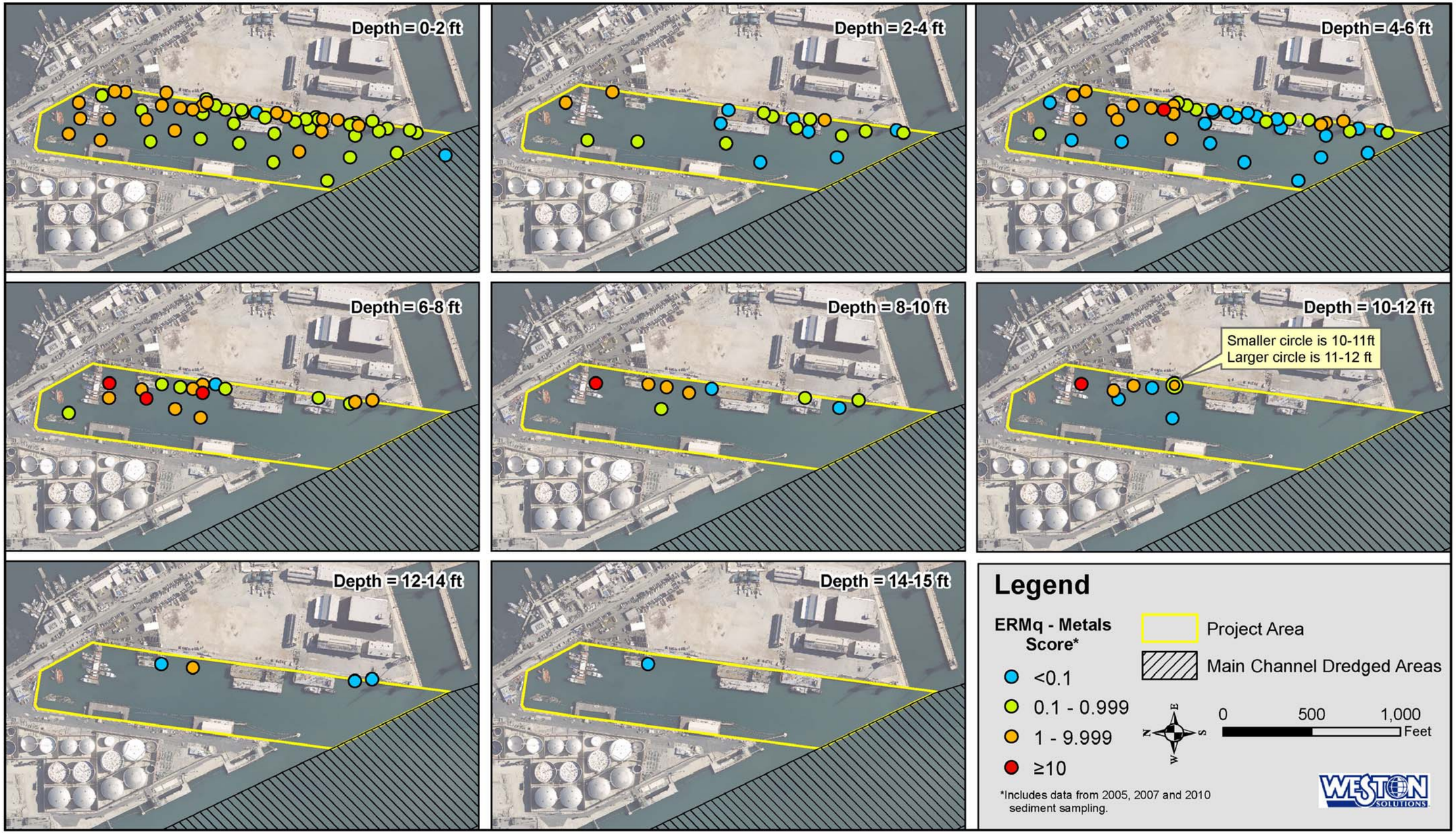

Figure 9. Horizontal and Vertical Distribution of Effects Range Median Quotient Metals Scores at Berths 240X, Y, and Z, Port of Los Angeles

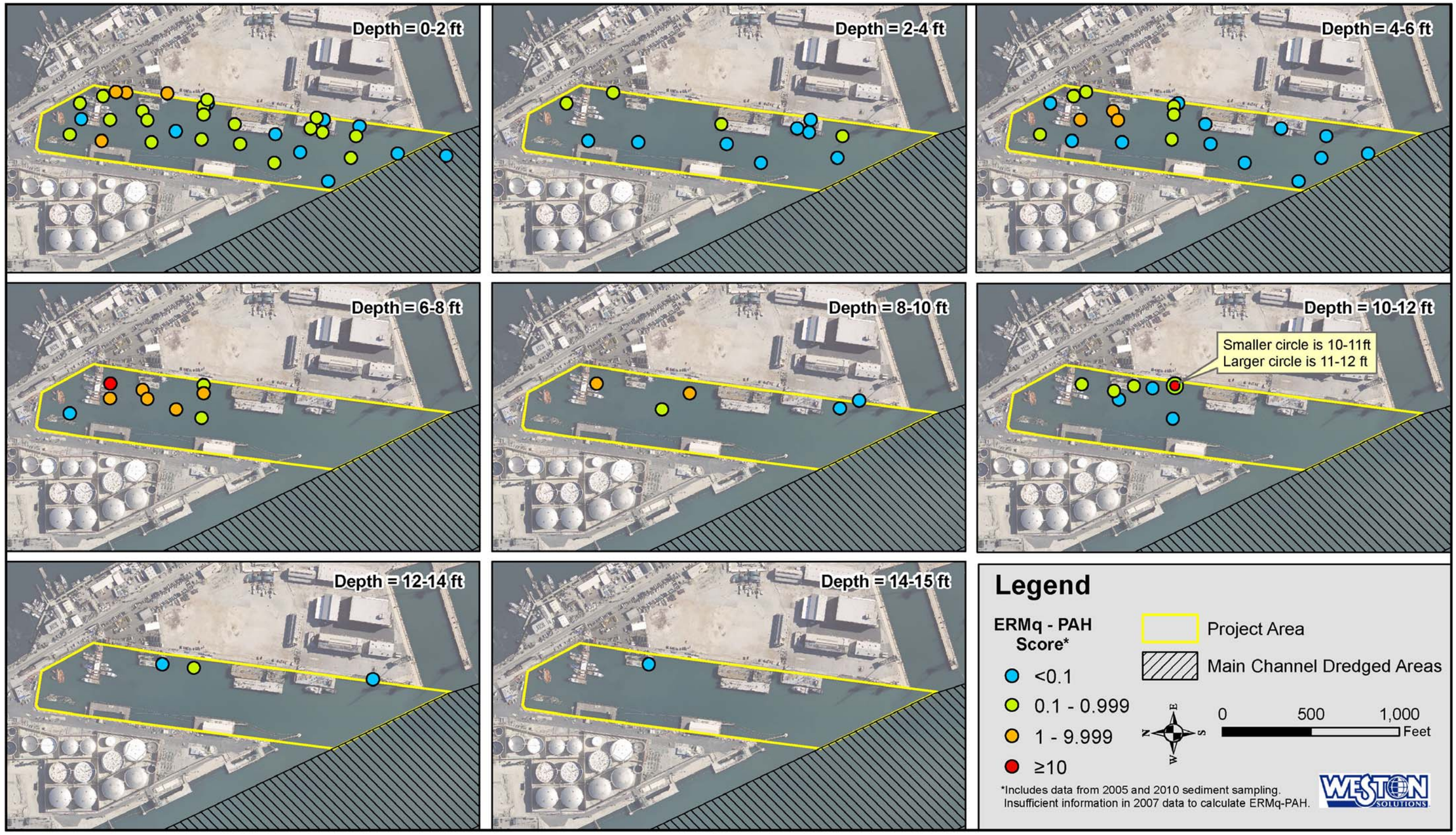

Figure 10. Horizontal and Vertical Distribution of Effects Range Median Quotient Polycyclic Aromatic Hydrocarbon Scores at Berths 240X, Y, and Z, Port of Los Angeles

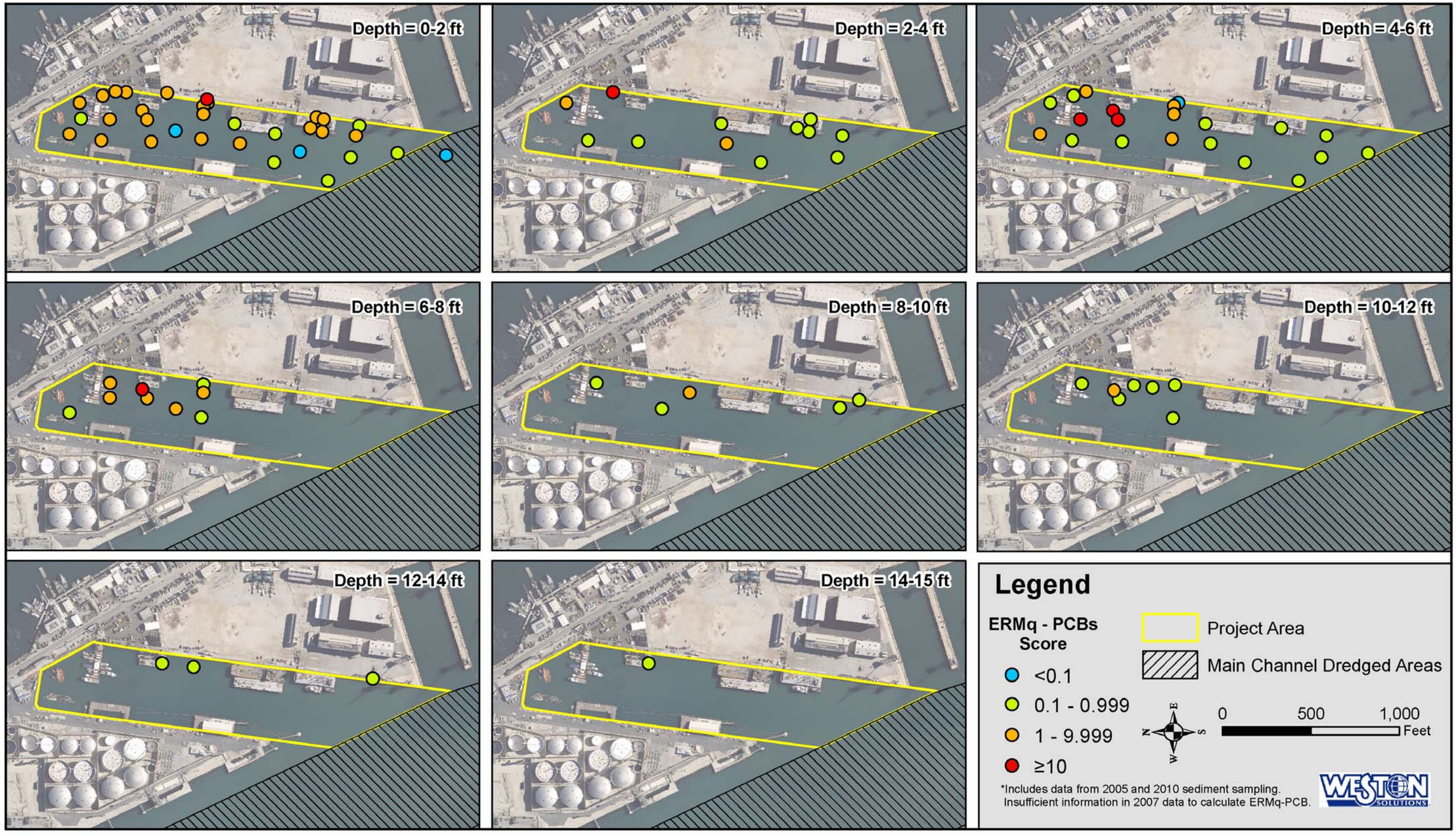

Figure 11. Horizontal and Vertical Distribution of Effects Range Median Quotient Polychlorinated Biphenyls Scores at Berths 240X, Y, and Z, Port of Los Angeles

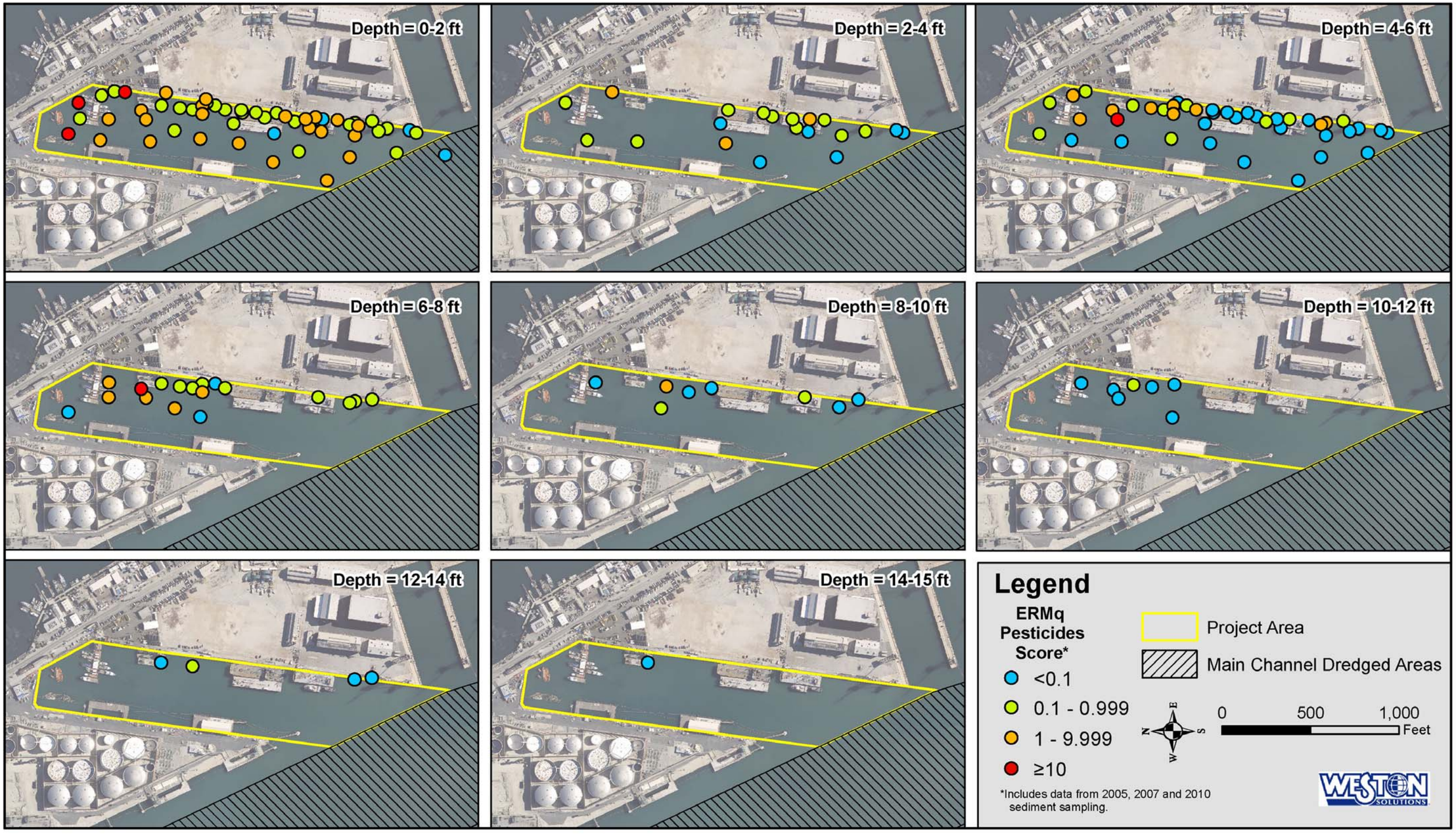

Figure 12. Horizontal and Vertical Distribution of Effects Range Median Quotient Pesticides Scores at Berths 240X, Y, and Z, Port of Los Angeles

5.0 CONCLUSIONS

Mean overall ERMq and SQO LOE scores were independently used to screen contaminant concentrations measured in sediments collected throughout the slip for the potential to cause direct effects in benthic biota. Concentrations were measured in sediments at selected locations throughout the slip to depth (i.e., up to 20-ft below mud-line) as well as in surficial sediments (0-2 ft) adjacent to storm drain outfalls and beneath the wharf at Berths 240X, Y and Z. In general, metals, PAHs, PCBs, and pesticides were elevated in surficial sediments throughout the slip but generally appear to be concentrated in the northeast quadrant and diminish with increased sediment depth as well as distance from the northeast corner of the slip.

Of the nine surficial samples collected adjacent to storm drain outfalls and under the wharf (diver cores) at Berths 240X, Y and Z, seven samples had overall mean ERMq scores greater than one (indicative of a potential for direct effects in benthic biota) and all nine samples received a maximum SQO LOE score of four (also indicative of a potential for direct effects).

In the Southern and Western portions of the slip, contaminant levels rapidly diminished with increasing sampling depth with the majority of station locations showing ERMq levels <0.1 and SQO LOE scores of ≤ 2 indicative of a low probability of effects on benthic biota at the 4-6 ft sampling interval representing MLLW depths ranging from -36 to -44 feet. However, in the northeast quadrant of the slip, a "clean" depth interval could not be established as a consequence of poor sample recovery at depth due to the amount of rock and other debris encountered at a majority of the stations sampled in this area (e.g., stations 20, 22, 66, 71, 70, 75, and 76). Clean sediments (ERMq <1 and SQO LOE score ≤2) were encountered at the 12-14 ft sampling interval for station 40 (-46 ft MLLW), and at the 10-12 ft sampling intervals for stations 65 (-45 ft MLLW) and 73 (-48 ft MLLW) in the northeast quadrant.

After a comprehensive statistical evaluation of surficial sediment contaminant gradients relating to the storm drain outfalls, no clear connection could be discerned. Additionally, a statistically significant decrease in ERMq scores for pesticides, PCBs, PAHs, and metals was not observed for samples collected at increased distances from the storm drains. Storm drain outfalls may have contributed some level of contaminants (i.e., PCBs, PAHs, and metals) to sediments in the slip, however our ability to differentiate between storm drain outfall contributions and other potential sources of contamination was likely confounded by mixing and transport of sediments due to normal terminal operations, and existing elevated contaminant levels in the slip. Although this reconnaissance study did not provide a concentration gradient associated with these two outfalls, storm drain inputs, normal terminal activities, groundwater plumes and seeps, open conveyance through the wharf wall and associated rip-rap, sheet-flow run-off from a variety of contaminated landside sources, and remobilization due to slip traffic are potential sources of historical as well as future contaminant contributions.

In summary the following conclusions are reached:

- In the southern and western portions of the slip, clean sediments were encountered at depth intervals below approximately -45 ft MLLW.

- In the northeast quadrant of the slip, a clean layer could not be established as a consequence of poor sample recovery between 5 to 14-ft below mud-line (-38 to -50 MLLW). Clean sediment was encountered at a few selected locations at depths ranging from -45 to -48 ft MLLW, but other sites showed contamination at depths up to -50 ft MLLW.

- Distribution of metals, PCBs, and pesticide concentrations within the slip followed similar trends to that of the overall mean ERMq scores.

- PAH concentrations were generally low (ERMq score lower than 1) throughout the vertical and horizontal profiles of these slip sediments.

- No clear gradient linkage to these two storm drains outfalls could be determine based on an evaluation of surficial sediment samples collected for that purpose. Although storm drain outfalls may have contributed some level of contaminants (i.e., PCBs, PAHs, and metals) in the SWM site, our ability to differentiate between storm drain contributions and other potential sources of contamination (i.e., storm drain inputs, normal terminal activities, groundwater plumes and seeps, open conveyance through the wharf wall and associated rip-rap, sheet-flow run-off from a variety of contaminated landside sources, and remobilization due to slip traffic) was not evaluated as part of this reconnaissance study, are potential sources of historical as well as future contaminant contributions.

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